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INDEX OF CONTENTS.

		Nos.		Nos.
MISCELLANEOUS	Abstr. 72.	Noted 26	1202-1274z	
General	1202-1213	Weed control in fruit crops .. 1582-1584
Recent developments	.. ..	.. ..	1214-1219	Weed control in ornamentals .. 1585-1587
Meteorology	.. ..	.. ..	1220-1223	Weed control in tropical crops .. 1588-1593
Growth substances	.. ..	.. ..	1224-1235	Noted 1594a-1594c
Physiology and chemistry	.. ..	.. ..	1236-1249	
Fertilizers and nutrition	.. ..	.. ..	1250-1260	VEGETABLES AND MISCELLANEOUS TEM-
Irrigation and soil moisture	.. ..	.. ..	1261-1265	PERATE CROPS
Glasshouses	.. ..	.. ..	1266-1270	Abstr. 213. Noted 26
Seed production	.. ..	.. ..	1271-1273	Vegetables, general .. 1595-1808z
Noted .. ..	.. ..	.. ..	1274a-1274z	Vegetables, particular .. 1617-1724
				Potatoes .. 1725-1773
TREE FRUITS, DECIDUOUS				Tobacco .. 1774-1795
Abstr. 94. Noted 12				Drug plants .. 1796-1804
General	.. ..	.. ..	1275-1369 1	Fibres .. 1805
Breeding and varieties	.. ..	.. ..	1275-1285	Rubbers .. 1806-1807
Propagation and rootstocks	.. ..	.. ..	1286-1304	Noted 1808a-1808z
Pollination	.. ..	.. ..	1305-1318	
Growth and nutrition	.. ..	.. ..	1319-1331	FLORICULTURE
Pruning, training and thinning	.. ..	.. ..	1332-1335	Abstr. 70. Noted 9
Manuring and soil management	.. ..	.. ..	1336-1345	General .. 1809-1835
Irrigation	.. ..	.. ..	1346-1352	Bulbs, tubers, etc. .. 1836-1853
Preharvest treatment	.. ..	.. ..	1353-1356	Roses and other shrubs .. 1854-1876
Harvesting and packing	.. ..	.. ..	1357-1361	Lawns .. 1877-1878
Noted .. ..	.. ..	.. ..	1362-1368	Noted 1879a-1879i
			1369a-1369 1	
				SUB-TROPICAL CROPS
SMALL FRUITS, VINES AND NUTS				Abstr. 88. Noted 6
Abstr. 49. Noted 5				General .. 1880-1882
Small fruits	.. ..	.. ..	1370-1419e	Avocadoes .. 1883-1898
Vines	.. ..	.. ..	1370-1387	Citrus .. 1899-1938
Nuts	.. ..	.. ..	1388-1409	Dates .. 1939-1941
Noted .. ..	.. ..	.. ..	1410-1418	Papaws .. 1942-1944
			1419a-1419e	Persimmons .. 1945-1949
				Sweet potatoes .. 1950-1957
PLANT PROTECTION OF DECIDUOUS FRUITS				Tung .. 1958-1960
Abstr. 146. Noted 26				Other crops .. 1961-1967
General	.. ..	.. ..	1420-1566z	Noted 1968a-1968f
Nutritional disturbances	.. ..	.. ..	1420-1423	
Climatic factors	.. ..	.. ..	1424-1429	TROPICAL CROPS
Virus diseases	.. ..	.. ..	1430-1455	Abstr. 116. Noted 11
Bacteria	.. ..	.. ..	1456-1461	General .. 1969-2085k
Fungi	.. ..	.. ..	1462-1464	Bananas .. 1969-1977
Nematodes	.. ..	.. ..	1465-1484	1978-1982
Mite and insect pests	.. ..	.. ..	1485	Cacao .. 1983-1998
Birds	.. ..	.. ..	1486-1526	Cinchona .. 1999
Rodents	.. ..	.. ..	1527-1528	Cloves .. 2000
Antibiotics	.. ..	.. ..	1529-1531	Coconuts .. 2001-2008
Sprays and spraying	.. ..	.. ..	1532-1534	Coffee .. 2009-2017
Fungicides	.. ..	.. ..	1535-1537	Fibres .. 2018-2021
Insecticides	.. ..	.. ..	1538-1542	Guavas .. 2022
Insecticidal plants	.. ..	.. ..	1543-1561	Mangoes .. 2023-2027
Noted .. ..	.. ..	.. ..	1562-1565	Oil palms .. 2028-2032
			1566a-1566z	Pineapples .. 2033-2036
				Rubbers and other laticiferous plants .. 2037-2042
WEEDS AND WEED CONTROL				Sugarcane .. 2043-2065
Abstr. 27. Noted 3				Tea .. 2066-2071
Herbicides	.. ..	.. ..	1567-1594c	Vanilla .. 2072-2073
Particular weeds	.. ..	.. ..	1567-1570	Other crops .. 2074-2084
Weed control in vegetables	.. ..	.. ..	1571-1577	Noted 2085a-2085k
			1578-1581	

				Nos.					Nos.
STORAGE AND PLANT PRODUCTS					NOTES ON BOOKS AND REPORTS				
	Abstr. 35.	Noted 22		2086-2121v		Abstr. 56.	Noted 3		2122-2178c
Storage				2086-2099	Books and reports				2122-2174
Frozen pack				2100-2102	New periodicals				2175-2177
Drying				2103	Noted				2178a-2178c
Food values				2104-2106					
Processing and products				2107-2120					
Noted				2121a-2121v					

Total Abstracts 966. Noted 149.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

1202. RIGG, T.

Cawthron Institute.

Research, 1950, 3: 131-5.

A short review of the work of the Cawthron Institute, established at Nelson, New Zealand, in 1920. The work of the four main scientific departments is concerned with (1) soil and general agricultural problems, (2) plant chemistry and mineral deficiency problems of stock, (3) insect problems of farm, orchard and timber, and the biological control of noxious weeds, and (4) fungus disease problems of fruit, hops, tobacco and market garden crops.

1203. WEST OF SCOTLAND AGRICULTURAL COLLEGE.

Guide to Auchincruive.

[Publ.] West of Scotland Agricultural College, 1949, pp. 58.

The horticultural facilities of the college are set out on pp. 53 and 54. They include equipment for fruit, vegetable and ornamental cultivation. Research is in progress on red core of strawberries, tomatoes, raspberries and plums.

1204. DAY, C. A., AND DOW, G. F. (MAINE.)

Thirty minutes with the Maine Agricultural Experiment Station.

Misc. Publ. Me agric. Exp. Stat. 616, 1949, pp. 27.

A popular account of the high lights of research at Orono, Maine, on various crop problems including those of potatoes, apples and blueberries.

1205. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS.

List of plant breeders in Canada and the United States of America.

Publ. F.A.O., Washington, D.C., 1949, pp. 64, 75 cents.

Information is given in three forms: (1) a list of plant breeders, with their addresses and mention of the plants on which they work, (2) a list of stations in Canada and the United States where plant breeding work is being carried out, with mention of the plants being studied and names of the workers, and (3) an alphabetical list of plants giving the names of the breeders working on each. Only breeders working in official institutions, and not those in commercial firms, have been included. It is hoped to extend the lists gradually to cover plant breeding work in other countries.

1206. DIVISION OF ENTOMOLOGY, PRETORIA.

Information for nurserymen in connection with the requirements under the Agricultural Pests Act of 1911.

Bull. Dep. Agric. S. Afr. 306 (Ent. Ser. 32), 1949, pp. 16, illus.

This bulletin includes notes on registration, fumigation chambers, fumigation details, inspection and quarantine of nurseries (with a list of quarantine pests), dealers in nursery stock, transportation of nursery stock, and export of nursery stock outside the Union, with advice on what to do and what to avoid.

1207. BRITISH STANDARDS INSTITUTION.

Bibliographical references.

[Publ.] British Standards Institution, 1950, pp. 19, 2s. 6d.

A standard method for citing bibliographical references was recently drawn up by a committee the actual members of which belonged to the following bodies: Aslib, British Museum, Library Association, and Science Library.

1208. PEARSON, C. E.

Recent changes in horticultural cropping.

Agriculture, Lond., 1950, 57: 32-5.

Trends in acreages and yields are discussed in general terms for fruit, vegetables and glasshouse crops in Britain.

1209. BUTZ, W. T., AND LEE, W. A.

Patterns of fruit and vegetable production in Pennsylvania.

Bull. Pa agric. Exp. Stat. 520, 1950, pp. 46, illus.

The purpose of this study was to describe some of the economic characteristics of the fruit and vegetable industry in Pennsylvania. To accomplish this purpose, data have been collected to demonstrate: 1. Relative importance of the industry. 2. Relative importance of individual fruits and vegetables. 3. Location of fruit production and vegetable production. 4. Seasonal competition among States supplying fruits and vegetables to the Philadelphia market. 5. Trends in production of individual fruits and vegetables. [Authors' preamble.]

1210. WARNE, L. G. G.

The effect of fatigue on thinning.

Fruitgrower, 1950, 109: 562.

The results of a single experiment on the thinning of globe beet, conducted at the University of Manchester,

indicate that, whilst fatigue of the workers has a marked effect on the rate of work, its effect on the quality of the work is so small as to be of no real importance.

1211. HOWES, F. N.

Honey and its botanical sources.

Research, 1950, 3: 127-31, bibl. 4, illus.

This article, which is essentially the same as one published in *Food*, 1949, 18: 106-10 [see *H.A.*, 19: 2650], deals with the factors affecting nectar secretion, the composition of honey and the main botanical sources of honey in various parts of the world.

1212. HOWES, F. N.

Poisoning from honey.

Food Manuf., 1949, 24: 459-62, bibl. 4, illus.

In various parts of the world occasional poisoning from honey is noted. In Eastern Europe and also in Britain honey derived from rhododendrons is occasionally found to be toxic. In New Zealand *Cortaria arborea* is said to be the cause of honey poisoning, in America *Kalmia latifolia*, *Gelsemium sempervirens* and possibly species of *Pieris*, *Andromeda* and *Leucothoe*, and in Japan *Tripetaleia paniculata*.

1213. SEPTROUX, J.

Les explosifs en agriculture et en horticulture. (The use of explosives in agriculture and horticulture.)

Rev. Agric. Brux., 1949, 2: 19-28.

Explosives may be used for a diversity of agricultural purposes, including the preparation of land prior to planting fruit trees, the grubbing of tree stumps, the rejuvenation of old orchards, drainage, subsoiling, and breaking up superficial boulders. Directions are given for the handling of explosives used in these ways.

Recent developments.

1214. NITSCH, J. P.

Culture of fruits "in vitro".

Abstr. in *Amer. J. Bot.*, 1949, 36: 827.

Flowers at full bloom were cut off the plant and planted in sterile nutrient media. The first success was achieved with tomatoes. The ovaries grew regularly, although to a smaller size, turning red and maturing at the same rate as those fruits left on the plant. The initial nutrient media contained mineral salts, sucrose, thiamin, and cysteine with the addition of tomato juice. Now tomatoes are grown on completely synthetic solutions where tomato juice is replaced by parthenocarp-inducing substances like beta-naphthoxyacetic acid. Using this technique, a study on fruit growth has been started in its connexion with pollination and parthenocarp. A new test for parthenocarp inducing substances is suggested. [Author's abstract.] —California Institute of Technology, Pasadena. [See also *H.A.*, 20: 503.]

1215. JANSEN, L. L., AND BONNER, J.

Development of fruits from excised flowers in sterile culture.

Abstr. in *Amer. J. Bot.*, 1949, 36: 826.

Preliminary experiments in the study of growth factor requirements for fruit development have shown the feasibility of using tissue culture techniques with excised pollinated flowers of *Lycopersicon pimpinellifolium*. Growth to maturity, including lycopene

formation, on completely synthetic media has made possible an approach to the biochemical study of fruit growth. Excised flowers can be effectively sterilized by hypochlorite or Zephiran Chloride solutions. After planting, the ovaries, which have an initial diameter of about 1 mm., increase to a final diameter of 4-8 mm. in from 1 to 2 months. Hand dissection of the largest cultured fruits obtained revealed normal development of the pericarp and gelatinous placental tissue in the locules, though ovules had not matured. This may indicate that the growth factor requirements for ovule development are more complex than for the fruit proper. Media employed in these preliminary experiments contain the usual mineral salts, trace elements, sucrose, and special organic supplements. Maximum rate and extent of development has been achieved with media including casein hydrolysate, indoleacetic acid, and a mixture of eleven B-vitamins. Slightly smaller but good development has been obtained with B-vitamins as sole supplements. Exogenous indoleacetic acid does not appear to be required. [From authors' abstract.]—California Institute of Technology, Pasadena.

1216. DI DELUPIS, S. D.

La teoria atomica nelle applicazioni agricole. (The application of the atomic theory to the practice of agriculture.)

Tabacco, 1949, 53: 195-214.

The author describes the observations made by him in 1938-9 on sugar-beet analyses, which led him to propound the theory that the plant, being an organism living in equilibrium with its surroundings, actually behaves as though it were dependent on a material entity subject to the laws of quantum mechanics, which define the behaviour of an ordinary electron. He proceeds at considerable length to show how the elucidation and a knowledge of the relation between the many factors concerned may lead, in the not very distant future, to such changes in technique as will assure the raising and cultivation of immeasurably better crops than are at present at our disposal. Tobacco is one of the plants now being worked on by him.

1217. (BERGERON, T.)

Problem of artificial control of rainfall over the globe.

Met. Mag., 1949, 78: 330-2.

In a lecture given at the Meteorological Office in September 1949, and reported here, Dr. Tor Bergeron explained how the best prospects for artificial seeding to induce rainfall appear to be given by some kinds of orographic cloud. The desirability is discussed of overseeding coastal cloud systems so that a coastal maximum of precipitation is avoided and the most efficient ratio of ice particles to water droplets obtained farther inland.

1218. KRETSCHMER, G.

Wachstum-Messungen an Pflanzen auf dem Acker. (Growth measurements of plants in the field.)

Z. Pfl.Ernähr. Düng., 1949, 47: 213-36, bibl. 2.

The results of measurements of cereals and flax in the field are presented and discussed. The simple

apparatus, with which the measurements were carried out, is described.—Agrarmet. Versuchsstat. Buchenbühl.

1219. HILLS, O. A., AND TAYLOR, E. A.
A sprayer for dispensing small measured quantities of liquid.
Publ. U.S. Dep. Agric., agric. Res. Administ., Bur. Ent. Pl. Quar. ET-280, 1950, pp. 2, illus.

The sprayer, which is described with the aid of photographs, can be used to spray single plants without affecting adjoining ones.

Meteorology.

1220. ANON.
Climatological table for the British Commonwealth, year 1948.
Met. Mag., 1949, 78: 187.

Attention is drawn to these tables summarizing figures for pressure, absolute and mean temperatures, relative humidity, mean cloud amount, precipitation and bright sunshine, recorded in 1948 from 35 meteorological stations throughout the Commonwealth. Tables of monthly figures are published in each of the preceding numbers of the journal and are summarized in the December number. This monthly series, which makes a useful basis for comparison of climatic factors in different parts of the Commonwealth, was started in January 1947.

1221. GLOYNE, R. W.
Meteorology and agriculture—some practical problems.
Quart. J. roy. met. Soc., 1949, 75: 309-18, bibl. 9.

The discussion consists of 3 parts. (1) The application of weather forecasts: (a) the meteorology of spraying, (b) the forecasting of outbreaks of potato blight. (2) Applied climatology. (3) Deterioration of food-stuffs [potatoes] in storage and during transit.

1222. PENMAN, H. L.
A general survey of meteorology in agriculture and an account of the physics of irrigation control.
Quart. J. roy. met. Soc., 1949, 75: 293-302, bibl. 12.

Weather problems in farming fall into three groups. Statistical problems include the forecasting of weather for strategical and tactical use in planning farming operations, and the forecasting of crop yields from weather data. Biological problems arise in studies of growth and of the spread of disease, and demand a wider knowledge of techniques suitable for use in micro-meteorology. Physical problems are largely transport problems in the building up of plant and animal environments. [From author's summary.]

1223. TAMM, E.
Bodentemperaturen unter verschiedenen Pflanzenbeständen. (Soil temperatures under different plant associations.)
Z. Pflernähr. Düng., 1949, 47: 29-34.

Extensive measurements of soil temperatures at a depth of 5 cm. were carried out from 1935 to 1939 at

the Inst. f. Acker- und Pflanzenbau, Berlin. The crops considered include potatoes after earthing up. The problem is discussed in a general manner, but some data are presented graphically.

Growth substances.

(See also 1246, 1274h, 1312, 1328, 1330-1332, 1357-1360, 1429, 1432, 1567-1594b, 1704-1709, 1736-1738, 1780, 1856, 1916, 2012, 2092, 2093, 2095, 2123.)

1224. HATCHER, E. S. J.
The use of growth-promoting substances in the vegetative propagation of plants.)
Ann. appl. Biol., 1949, 36: 562-6, bibl. 15.

A review discussing the development of the growth-substance method, technique of growth-substance treatment, factors influencing rooting response, East Malling propagation studies, action of the growth substance on the cutting, and auxin analysis of the shoot and cutting.

1225. BENTLEY, J. A.
Growth-regulating effect of certain organic compounds.
Nature, 1950, 165: 449, bibl. 5.

Experimental work at the Department of Botany, Manchester University, showed that the "straight-growth" method, in which the growth of sections of the *Avena* coleoptile in test solutions is measured, can be used as a standardized technique for assaying the activity of growth-regulating substances. The data presented indicate that at 1 mg./litre 2,3,6-trichlorbenzaldehyde is more active and 2,3,6-trichlorbenzoic acid is less active than β -indolylacetic acid. Comparative figures are given also for concentrations of 10.0, 1.0 and 0.1 mg./litre. "It would appear, from these results, that a side-chain with a dipole at an angle to the ring, or a free ortho position in the ring, is not always necessary for activity", as has been postulated.

1226. WEINTRAUB, R. L., AND BROWN, J. W.
Translocation of exogenous growth-regulators in the bean seedling.
Plant Physiol., 1950, 25: 140-9, bibl. 17, illus.

Growth regulating chemicals applied to the leaf of a bean seedling devoid of translocatable carbohydrates are not transported from the leaf to the stem. Movement of such growth regulators can be brought about by supplying sugar to the leaf externally. In the experiments reported here, it was shown that many different sugars are able to induce translocation, and that growth regulators of diverse structural types are transportable. This non-specificity with respect to both sugar and growth regulator suggests that transport of the stimulus is facilitated by the occurrence of food movement in general rather than by the occurrence of a specific combination between the two. Growth regulator translocation of the type facilitated by sugar movement takes place only through living cells, presumably of the phloem. When the growth regulator is introduced into the transpiration stream, however, translocation is independent of the movement of sugar, and may take place through non-living cells.—Camp Detrick, Frederick, Md.

1227. JAKOWSKA, S., NIGRELLI, R. F., AND GOLDSMITH, E. D.

Plant growth-regulating effects of aminopterin.

Abstr. in *Amer. J. Bot.*, 1949, 36: 825-6.

Seeds of *Allium cepa* germinated after immersion in solutions of aminopterin (Lederle) varying in concentrations from 0.001 to 1.0 mg. % at a pH of about 5.0. The mitotic rate was appreciably and variously affected by different concentrations. The length of all treated plants was equal to that of the controls at the end of 7 days. Compensatory growth by elongation and differentiation probably occurred. All seedlings developed green leaves of normal appearance. Seeds treated with 0.005% of indole-3-acetic acid germinated but failed to differentiate further. The same concentration of the auxin in combination with aminopterin in concentrations above 0.01 mg. % resulted in some further differentiation. When the concentration of aminopterin was decreased below this level, typical development occurred. No colchicine or toxic effects were noted in root tips, grown from bulbs, treated with high concentrations (5 mg. % or more) of aminopterin for short intervals. Toxic effects appeared after 6 hours. Most bulbs treated for 7 days with aminopterin in concentrations varying from 0.001 to 0.25 mg. % became necrotic. Some developed roots by elongation; few mitotic figures were seen in root primordia. The experiments indicate that the higher concentrations of aminopterin interfere with mitosis but not cell elongation. The lowest concentration (0.001 mg. %) used seemed to stimulate cell division. [From authors' abstract.]

1228. DE ROPP, R. S.

The comparative growth promoting action of 3-indoleacetic acid and *Agrobacterium tumefaciens*.

Abstr. in *Amer. J. Bot.*, 1949, 36: 822-3.

Experiments on carrots and Jerusalem artichokes indicate that whereas 3-indoleacetic acid can be considered a growth-promoting agent, the crown gall organism is a mutagenic agent.—N. York Bot. Gdn.

1229. HENDERSÓN, J. H. M., AND BONNER, J.

A comparison of auxin metabolism in crown-gall and callus tissue of sunflower.

Abstr. in *Amer. J. Bot.*, 1949, 36: 825.

Growth studies *in vitro* of sunflower tumour (crown gall) and callus tissue revealed that the latter requires relatively high concentrations of indole-3-acetic acid (IAA) for optimum growth (1-10 γ /cc.) whereas tumour tissue grows best in a medium containing no IAA or very low concentrations (0.01-0.1 γ /cc.). This suggests that, while callus is dependent on an exogenous source of auxin, tumour tissue is able endogenously to supply its own auxin requirements. Other experiments have shown that tumour tissue contains higher levels of free tryptophan, and higher concentrations of the enzyme system which converts 1-tryptophan into IAA, than callus tissue.—California Institute of Technology, Pasadena.

1230. DE ROPP, R. S.

The experimental inhibition of the growth of plant tumors.

Abstr. in *Amer. J. Bot.*, 1949, 36: 823.

Fragments of chrysanthemum stem inoculated with crown gall bacteria and cultured *in vitro* have been used as test objects in a survey of substances for tumor inhibiting action. Six analogues of folic acid, all known to have an inhibiting action on the growth of animal tumours, have been shown also to inhibit the growth of crown gall tumours in concentrations as low as 1 mg. per litre. [From author's abstract.]—N. York Bot. Gdn. [See also *H.A.*, 19: 228.]

1231. BONNER, W. D., Jr., AND THIMANN, K. V.
Studies on the growth and inhibition of isolated plant parts. III. The action of some inhibitors concerned with pyruvate metabolism.

Amer. J. Bot., 1950, 37: 66-75, bibl. 20, illus.

The action of 3 inhibitors, fluoride, fluoroacetate and 1-amino-2-naphthol 4-sulphonic acid, which bear on pyruvate mechanism is presented in some detail, together with experiments on the reversal of their effects. *Avena* coleoptiles and stem segments of *Pisum* were used as experimental material. The role of reactions involving pyruvate in the metabolism leading to growth is discussed. [For parts I and II of this series see *H.A.*, 18: 2375 and 19: 1719.]—Harvard University, Cambridge, Mass.

1232. RIETSEMA, J.

A modified cylinder test of high sensitivity for growth substances. (Preliminary note II.)

Meded. bot. Lab. Rijks-Univ. Utrecht 7, 1949, pp. 12, bibl. 26, being Repr. from *Verh. Akad. Wet. Amst.*, 1949, 52, No. 10.

A modification of the cylinder test for growth substances is described in which the growth substance is added 6 hours after the immersion of the sections into the liquid. It is possible to estimate indole-3-acetic acid concentrations down to 10^{-5} mg./l. A volume of 2 ml. solution is enough for the test: so an amount of 2.10^{-8} mg. can be estimated. By plotting the log of the concentration against the log of the increase in growth rate a straight line is obtained, fit for intrapolarization.

1233. RICE, E. L.

Effect of various plant growth-regulators on flowering and yield of bean plants in field plots.

Abstr. in *Amer. J. Bot.*, 1949, 36: 828.

Stringless green pod bean plants were sprayed with aqueous solutions of sodium 2,4-dichlorophenoxyacetate [Na (2,4-D)], sodium 2,4,5-trichlorophenoxyacetate [Na (2,4,5-T)], or 4 chloro-o-toloxycetic acid [4-o-T] at concentrations of 0.1, 1.0 or 10 p.p.m. At the time of spraying the second trifoliate leaf was just beginning to expand. Concentrations of 0.1 and 1.0 p.p.m. had no appreciable effect on the time of flowering; neither had concentrations of 10 p.p.m. 4-o-T. Plants treated with 10 p.p.m. Na (2,4-D), however, were retarded in flowering for about 2 days and showed pronounced morphological effects. Plants treated with 10 p.p.m. Na (2,4,5-T) were retarded in flowering for about 4 days, but no outward morphological effects were observed. These last 2 treatments resulted in no statistical difference in total yield.—University of Oklahoma, Norman.

1234. RHODES, A., TEMPLEMAN, W. G., AND THRUSTON, M. N.

The effect of the plant growth regulator, 4-chloro 2-methyl phenoxyacetic acid, on the mineral and nitrogen contents of plants.

Ann. Bot. Lond., 1950, 14: 181-98, bibl. 7.

Young tomato plants growing in sand culture in pots and receiving different levels of potassium and sodium were subjected to 4 sub-lethal concentrations of MCPA. MCPA caused marked diminution of the K_2O content of the "tops" and lower stems and a marked accumulation in the roots. Similar effects were found with another susceptible species, rape, whereas with more resistant species, corn chamomile and oats, the effect was negligible. In tomatoes trends for P_2O_5 and total N were similar to those for K_2O but very much smaller; and there was little, if any, effect on contents of Mg, Na, Mn, Ca or Fe.—I.C.I. Jealott's Hill Res. Stat.

1235. EIGSTIL, O. J., AND DUSTIN, P., Jr.

Colchicine bibliography III.

Lloydia, 1949, 12: 185-207.

This supplements an earlier edition in 1947, *Ibid.*, 10: 65-114. These bibliographies are aimed at facilitating a review of the literature, which will form the basis of a monograph in course of preparation by the authors on colchicine from the standpoint of animal and plant cytology.

Physiology and chemistry.

1236. ALVIM, P. DE T.

Studies on the mechanism of stomatal behavior.

Amer. J. Bot., 1949, 36: 781-91, bibl. 36, illus.

In an attempt to determine the mechanism or mechanisms that cause stomatal movement, a comparative study was made between the "starch-sugar mechanism" and the "colloidal imbibition mechanism". Leaves of zebbrina, geranium and bean were used, as these contain respectively a high, medium and low quantity of colloidal substance in the guard cells. It was found that stomatal opening was always associated with a decrease in the amount of starch in the guard cells. Opening of zebbrina stomata was not associated with swelling of the colloidal content of the guard cells. No correlation could be established between the colloidal content of the guard cells and the rate of light-induced stomatal opening or the response of the stomata to pH. These and other results indicate that the "starch-sugar mechanism" is the most important, if not the only, mechanism involved in the process of stomatal movement.

1237. GREGORY, F. G., AND OTHERS.

Experimental studies of the factors controlling transpiration. I. Apparatus and experimental technique.

J. exp. Bot., 1950, 1: 1-14, bibl. 7, illus.

Apparatus and experimental techniques are discussed for use in the investigation of transpiration rate of leaves as controlled by stomatal aperture and leaf water content. [From authors' summary.]—Imp. Coll. Sci. and Technology, London.

1238. GREGORY, F. G., AND OTHERS.

Experimental studies of the factors controlling transpiration. II. The relation between transpiration rate and leaf water content.

J. exp. Bot., 1950, 1: 15-28, bibl. 24.

Data are presented which show, when stomatal control is eliminated, that wheat leaves may lose 5-6% and *Pelargonium* leaves 10-12% of their water without any reduction in the transpiration rate. Experiments in which *Pelargonium* and wheat leaves, with stomatal control present, were submitted to cycles of changing water content also failed to establish any direct relation between transpiration rate and leaf water content. It is concluded that leaf water content over the range of 70-100% of that present in the turgid state has no significant effect in determining the rate of water loss from leaves. A repetition of Knight's experiment showed that stomata opened in still air and closed in moving air. This was not recorded by Knight, who used a porometer cup permanently attached to the leaf. It is concluded that the higher transpiration rate recorded by Knight after a period of still air was due to wider stomatal aperture and not to the higher leaf water content as suggested by him. [Authors' summary.]—Imp. Coll. Sci. and Technology, London.

1239. WILLIAMS, W. T.

Studies in stomatal behaviour. IV.* The water-relations of the epidermis.

J. exp. Bot., 1950, 1: 114-31, bibl. 24.

It is shown that a dry external atmosphere exerts the following effects on stomatal movement: (a) A striking acceleration of closure in darkness. (b) A slight acceleration of opening in light. (c) If the water-supply to the leaf is impaired, an inability to maintain full opening in the light. Conversely, a saturated external atmosphere induces sluggishness of movement and a tendency to incomplete closure in darkness. These results are considered to support La Rue's contention that the epidermal water-supply is drawn solely by lateral movement from the main veins, and not from the underlying mesophyll. The stomatal phenomena themselves do not appear capable of any simple explanation based on current knowledge of guard-cell physiology. The biological significance of these results is discussed, with particular reference to the problem of xeromorphic structures, for which a new interpretation is suggested. [Author's summary.]—Bedford College, London.

1240. HEATH, O. V. S.

Studies in stomatal behaviour. V. The role of carbon dioxide in the light response of stomata.

J. exp. Bot., 1950, 1: 29-62, bibl. 34, illus.

It was found that stomata on illuminated leaves, both of *Pelargonium* and wheat, opened much wider where the leaf surface was enclosed in a small volume of air, as in a normal porometer cup, than elsewhere. A considerable body of data was collected which appeared to support the hypothesis that the wide opening was due to accumulation of some volatile substance produced by the leaf, but all the results were also consistent with the view that it was caused by reduction

* For papers I-III see *Ann. Bot. N.S.* 12: 35-51 and 13: 309-37; and *New Phytol.* 48: 186-211.

in the carbon dioxide content of the enclosed air below the normal 0.03% owing to photosynthesis. Further crucial experiments with both the porometer and infiltration methods left virtually no doubt that the latter hypothesis was correct. This extreme sensitivity of stomata to carbon dioxide concentration within the range 0.03% to zero is discussed in relation to their operation in nature, and a possible biological advantage is suggested. The bearing of the effect upon porometer investigations is also discussed. Several subsidiary effects, observed in the course of the investigation, are discussed; in particular an effect of humidity upon the rate of response to other factors. [From author's summary.]—Imp. Coll. Sci. and Technology, London.

1241. WILLIAMS, D. E., AND COLEMAN, N. T.
Cation exchange properties of plant root surfaces.

Plant and Soil, 1950, 2: 243-56, bibl. 8.

Tomato, lettuce, celery and tobacco are among the plants studied by the Division of Soils, University of California.

1242. BROWN, R., AND SUTCLIFFE, J. F.
The effects of sugar and potassium on extension growth in the root.
J. exp. Bot., 1950, 1: 88-113, bibl. 12.

A new technique for studying extension growth in the root is described which is based on excising a zone which extends 1.5-3.0 mm. from the tip. Large numbers of these segments are cultured with different nutrient fluids in the dark at 25° C. with continual shaking. The effects of a large number of nutrients on the growth of such segments [of *Zea*] have been studied, but only two, sugar and potassium ions, have been found to have stimulating effects. It has been shown that with increasing concentration of sugar in the medium, the rate of growth, the time during which growth proceeds, the internal concentration, respiration, dry weight, and cellulose formation all increase, also that potassium stimulates the rate of growth and respiration, and that with 5% oxygen all the aspects studied are depressed. It is suggested that the stimulation due to sugar may be attributed to an acceleration of water absorption with a complementary increase in cellulose formation. It is further suggested that sugar accelerates water absorption by accumulating in the vacuole and thus sustaining the osmotic pressure of the vacuolar sap. It is further suggested that potassium stimulates growth by increasing water absorption through an effect on respiration. The effect of respiration in this connexion may be to promote the transport of water directly or to enhance the osmotic pressure of the sap by inducing an accumulation of inorganic ions in the vacuole. [From authors' summary.]—University of Leeds.

1243. SANNIÉ, C.
Le rôle physiologique des pigments des fruits. (The physiological rôle of fruit pigments.)
Fruits d'outre mer, 1950, 5: 79-81, bibl. 7.

From a brief review of the subject the author concludes that plant pigments play an important part in the life of the plant and may also have an effect on human physiology.

1244. KOZLOWSKI, A.
Formation of a green oxidation-reduction indicator in plant extracts.
Nature, 1950, 165: 495.

The green pigment, which may serve as a natural indicator in various physiological investigations, was prepared as follows: "Yellow peelings of ripening 'Victoria' plums were put into boiling water, and the heating was discontinued immediately. After about thirty minutes, the extract was decanted; powdered sodium bicarbonate was added to bring the pH to 8-9, and the liquid was shaken with air." The same reaction was shown by extracts from the leaves and petals of certain other plants.—East Malling Research Station.

1245. BANDURSKI, R. S.
Synthesis of carotenoid pigments in detached bean leaves.
Bot. Gaz., 1949, 111: 95-109, bibl. 26, being *Contr. Hull Bot. Lab.* 609.

A method is described for the study of the synthesis of carotenoid pigment in detached green leaves: it is applicable to experiments as long as 24 hours and is sufficiently precise to detect small increases or decreases of pigment on a per-sample basis. [From author's summary.] Leaves of red kidney bean were used to ascertain to what extent synthesis of carotenoid pigments could be disentangled from photosynthesis.—Calif. Inst. Technology, Pasadena.

1246. GALSTON, A. W., AND BAKER, R. S.
Studies on the physiology of light action.
II. The photodynamic action of riboflavin.
Amer. J. Bot., 1949, 36: 773-80, bibl. 33.

"By means of *in vivo* and *in vitro* experiments it has been established that riboflavin is a photoreceptor in the destruction of auxin by visible light. Thus, the light-growth inhibition of etiolated pea epicotyl sections and the light-enhanced auxin destruction reported in the first paper of this series [see *H.A.*, 19: 771] are both believed due to the riboflavin-sensitized photooxidation of indoleacetic acid." It is thought probable that riboflavin is also a photoreceptor for phototropic curvature of *Avena* coleoptiles.—California Institute of Technology, Pasadena.

1247. BENSON, A. A., AND OTHERS.
The path of carbon in photosynthesis. V. Paper chromatography and radioautography of the products.
J. Amer. chem. Soc., 1950, 72: 1710-18, bibl. 30.

Paper chromatography has been employed to separate the radioactive products formed during photosynthesis in $C^{14}O_2$. The method has been used for the separation and identification of carboxylic acids and phosphate esters. The first observed product of carbon dioxide assimilation during photosynthesis has been isolated and shown to be phosphoglyceric acid. [Authors' summary.]

1248. GAWADI, A. G., AND AVERY, G. S., Jr.
Leaf abscission and the so-called "abscission layer".
Amer. J. Bot., 1950, 37: 172-80, bibl. 42, illus.

That the so-called "abscission layer" has no causal

relationship to leaf fall is demonstrated in this investigation by the following facts: (a) Poinsettia, cotton, and pepper, species in which the leaves ordinarily develop an abscission layer prior to leaf-fall, can be experimentally induced to drop their leaves before the abscission layer develops. (b) Leaf fall in impatiens occurs without any preliminary secondary cell division. There is, therefore, no abscission layer, yet abscission occurs readily, either normally or experimentally induced. (c) Leaves of tobacco never abscise naturally, nor can abscission be induced experimentally; yet there is occasionally evidence of secondary cell division in the abscission zone. In the light of these results, the authors consider that the term "abscission layer" should no longer be used. It is further shown that the role of the secondary cell division occurring at the base of the petiole of many dividing leaves is that of a forerunner of the protective tissue which forms the leaf scar. In some cases it may occur after leaf-fall. A theory is presented to explain natural abscission in terms of physiological circumstances in the leaf prior to leaf-fall.—Brooklyn Botanic Garden, N.Y.

1249. TAYLOR, H. J.

The duration of differentiation in excised anthers.

Amer. J. Bot., 1950, 37: 137-43, bibl. 16, illus.

An attempt to analyse the development of the sporogenous tissue of anthers of *Tradescantia paludosa* grown in various culture media, and to evaluate the usefulness of the technique in solving problems of meiosis and differentiation in general is reported.—University of Tennessee, Knoxville.

Fertilizers and nutrition.

1250. KENWORTHY, A. L.

Wheels of nutrition—a method of demonstrating nutrient-element balance.

Proc. Amer. Soc. hort. Sci., 1949, 54: 47-52, bibl. 2, illus., being *J. Art. Mich. agric. Exp. Stat.* 1102.

The method described was developed as a visual aid that would enable growers to compare all the nutrient-elements, or as many as desired, in relation to each other as affected by two treatments, or a series of treatments with a standard treatment. The basis is a circular chart with concentric rings representing respectively deficiency, hidden deficiency, optimum, approaching excess, and excess. The elements are shown round the edge of the chart and the level of each indicated by a spoke coming from the centre of the chart; hence the name wheel of nutrition.

1251. SCHANDERL, H.

Beweise für die Fähigkeit zur Assimilation des molekularen Stickstoffs durch die Bakteriensymbionten einiger Nichtleguminosen. (Proofs of the capacity of non-leguminous plants to assimilate molecular nitrogen with the aid of bacterial symbionts.) *Gartenbauwiss.*, 1940, 15: 1-27, bibl. 7 [received Nov. 1949].

[For an abstract of a later paper by the same author on a similar subject see *H.A.*, 14: 1474.] Cultural trials

indicate that certain non-leguminous plants utilize atmospheric nitrogen and observations in different localities suggest that walnuts, cherries and apricots are among them. Bacteria occurring in the protoplasm of mushroom and flowering plants were isolated and cultured.—Horticultural research station, Geisenheim on Rhine.

1252. TOMPOS, A.

Nitrogéngyűjtő növények és a talaj nitrogén-tartalma. (Nitrogen-fixing plants and the nitrogen content of soil.) [English summary 10 lines.]

Bull. Hungarian agric. Exp. Stat., 1947, 47-9: 31-2 [received 1949].

Contrary to accepted practice among farmers in Hungary the need for N fertilizers after leguminous crops was established at the Agricultural Experimental Station, Kaposvár. Soil analyses indicated that 94% of crops needed N after alfalfa, 78% after clover and 84% after peas.

1253. RUPRECHT, R. W.

Minor elements in fertilizers.

Agric. Chemls., 1950, 5: 4: 36-7.

Four reasons are given why minor elements should not be incorporated in mixed fertilizers, especially when these are used in the heavy dressings commonly applied to horticultural crops: (1) They are often unnecessary. (2) Danger of using toxic amounts. (3) Application by spraying is often more reliable. (4) Increased cost.

1254. HATCHER, J. T., AND WILCOX, L. V.

Colorimetric determination of boron using carmine.

Analyt. Chem., 1950, 22: 567-9, bibl. 6.

A precise and rapid method is described for the quantitative determination of boron, in traces to several hundred p.p.m., in such materials as waters, soil extracts and plant tissues. The procedure eliminates interference by nitrates and nitrites.

1255. JACOB, A.

Zur Frage der Magnesiadüngung. (On magnesium manuring.)

Z. Pflernähr. Düng., 1949, 47: 179-97, bibl. 66.

The subject is reviewed under the following heads: The Mg content of certain plants and parts of plants (including some fruits and vegetables); the function of Mg in the life of the plants; Mg deficiency symptoms; relations between Mg action and soil reaction; the Mg balance of the soil; the determination of the Mg requirements of a soil; and the results of manurial trials with Mg.

1256. HUNTER, J. G.

An absorptiometric method for the determination of magnesium.

Analyst, 1950, 75: 91-9, bibl. 26.

The method, which is based on the formation of coloured complexes of magnesium hydroxide with certain dyes of the Thiazol Yellow class, was developed for the determination of magnesium in plant tissues and soil extracts.

1257. ZELLER, A.

Zur Phosphorsäurebestimmung in Böden-
auszügen und Pflanzen. (Determination of
phosphoric acid in soil samples and plants.)
Bodenkultur, 1950, 4: 24-7, bibl. 12.

A modified method of colorimetric determination of phosphoric acid is outlined, which possesses about the same sensitivity and has considerable advantages over methods hitherto used.—Bundesanstalt für alpine Landw., Admont [Austria].

1258. KASERER, H.

Die Wirkungsweise der Keimlingsdüngung mit "Porro". Eine grundsätzliche Erörterung. ("Porro", a fertilizer for seedlings. A fundamental discussion.)
Bodenkult., 1950, 4: 70-7, bibl. 4.

The following claims, among others, are made for "Porro" [a proprietary substance containing a number of nutrients in siliceous earth as carrier, see also *H.A.*, 18: 1583 and 19: 1201]. It stimulates germination, makes for more even stand of the seedlings and induces better root development resulting in higher yields.

1259. ANON.

Humus from seaweed residues.
Fruitgrower, 1950, 109: 690, illus.

A note on the value of seaweed residues from the processing factories as a source of humus. The residues have a remarkable moisture-retaining capacity, and although they contain only negligible inorganic nutrients, they prevent the leaching of fertilizers applied to the soil. As it is not yet possible to obtain the materials cheaply in a dried form, transport is the main problem.

1260. TICQUET, C. E.

An unsuspected problem [of soilless culture].
Fruitgrower, 1950, 109: 601-2.

As a result of adsorption on to the surface of the culture medium, nutrient elements may accumulate to toxic concentrations in soilless culture systems, after a period of 3-6 years. This problem is especially serious with porous materials such as cinders or vermiculite. For the commercial grower, the best solution appears to be the use of a medium of small, non-porous gravel, which may be used for 10 years or more without giving trouble.

Irrigation and soil moisture.

(See also 1274m, y, 1353-1356, 1386, 1684, 1685, 1733, 1734, 1892, 1912.)

1261. WILCOX, J. C.

Soil moisture studies. IV. Indirect determination of field capacity for moisture.
Sci. Agric., 1949, 29: 563-78, bibl. 12.

Field moisture capacity of 93 samples, taken 24 hours after irrigation at depths of 4-8 in. and 10-14 in., were determined. No effect of organic matter content was apparent but in most cases the 4-8 in. samples had a higher organic matter content, a lower colloid content, and a lower field capacity. Evidence is presented to indicate that, as the soil particles become finer, the moisture content available for plant use increases to a certain point only.

1262. BOUYOUCOS, G. J.

A practical soil moisture meter as a scientific guide to irrigation practices.
Agron. J., 1950, 42: 104-7, bibl. 5, illus.

A simple, rapid and practical method intended for farmers, fruitgrowers, etc., is described for measuring the available moisture content of soils and as a guide to irrigation practices. It indicates when and how much to irrigate the soil and how deep the applied water has penetrated.—Michigan agric. Exp. Stat., East Lansing.

1263. PILLSBURY, A. F., AND HOOD, M. L.

Concrete irrigation systems.
Calif. Citrogr., 1950, 35: 92, 104, bibl. 2, illus.

Non-reinforced concrete irrigation pipe systems are in general use in surface irrigated farms in southern California. Water discharge is regulated by means of either overflow pot hydrants, two types of overflow stands or float valve stands, and these are shown diagrammatically. Hints are given for avoiding trouble through faulty planning or construction, or the use of chemicals that cause deterioration of the concrete.

1264. SIMONNEAU, P.

Observations sur la pratique des irrigations dans la plaine de l'Habra. (Observations on irrigation practices in the Habra plain in Algeria.)
Fruits et Prim., 1949, 19: 419-23.

Dates on which irrigation water was applied on various areas of different soil types, and quantities of water used on each occasion are given for various crops including melons, globe artichokes and several tree fruits. The figures compare with those obtained in earlier seasons and provide a basis on which growers can plan irrigation schedules.

1265. COONY, J. J.

Planning to install a sprinkler system?
Yearb. Calif. Avocado Soc. for 1949, pp. 96-100.

The necessity for professional engineering advice is stressed. Various apparatus and lay-out are discussed, and operating conditions described.

Glasshouses.

(See also 1597, 1660, 2165.)

1266. LAWRENCE, W. J. C.

The John Innes glasshouses.
John Innes Leafl. 10, 1950, pp. 12, illus., 1s.

The author gives a skeleton account of the glasshouses recently put up at Bayfordbury to test the following: behaviour and durability of different structural materials; efficiency of natural illumination as determined by size of glass, orientation and roof shape; causes of loss of heat; optimum position of heating pipes; ventilation systems and possibility of automatically controlling ventilation, heating and shading; effect of different degrees of humidity; and effect of different types of artificial light on seedling growth.

1267. ANON.

New "non-drip" cloche-frame.
Fruitgrower, 1950, 109: 560, illus.

A description is given of the new cloche-type "Sell-hurst" frames, to be marketed by Slough Estates (London) Ltd. It is claimed that they are watertight structures, although there is adjustable ventilation at the ridge. They are heavier than the average cloche, but cover considerably more ground.

1268. CRUZ, S. R.

Principles and design of the resistance-type soil sterilizer.

Philipp. J. Agric., 1949, 14: 181-211, bibl. 12, illus.

After reviewing the literature on the use of electricity for sterilizing soils the author describes, with the aid of diagrams, apparatus he designed while at Cornell University. The method is based on the use of a constant-current transformer such as is generally used in the series lighting of streets. Data obtained from tests is condensed in the form of equations of curves. Advantages claimed for the method are simplicity of construction, semi-automatic action, more uniform temperature distribution, absence of risk of shock, limited maximum power demand and ability to sterilize soil of high specific resistance. The soil moisture content requiring the least energy and also the minimum moisture content practicable for sterilization were also determined.

1269. O'ROURKE, F. L.

Mist humidification and the rooting of cuttings. (Progress report.)

Quart. Bull. Mich. agric. Exp. Stat., 1949, 32: 245-9, illus.

The rooting response of various shrub cuttings to this treatment compares favourably with that obtained under normal greenhouse practice. Types of mist humidifiers are discussed.

1270. PARKER, M. W., AND BORTHWICK, H. A.

A modified circuit for slimline fluorescent lamps for plant growth chambers.

Plant Physiol., 1950, 25: 86-91, bibl. 6.

A circuit for operating 8-foot slimline fluorescent lamps with incandescent-filament lamps as resistance ballast is described. The growth of soybeans as measured by weight and length of stems was compared when grown with four different sources of radiation. Plants grown with the radiation from an arc lamp supplemented with incandescent-filament lamps were heavier and the stem lengths were shorter than those grown with any of the other sources tested. The radiation from 4,500° white 8-foot slimline fluorescent lamps produced heavier plants with shorter stems when supplemented with the radiation from incandescent-filament lamps. These plants were superior to those grown in the greenhouse during the winter months and were comparable to those grown with natural radiation in the spring. [Authors' summary.]—Bur. Pl. Ind., U.S.D.A., Beltsville, Md.

Seed production.

(See also 1600-1601.)

1271. NILSSON-LEISSNER, G.

Sort-och stamkontrollen som ett led i utsädesanalyseringen. (The state inspection of varieties and strains in Sweden.)

Årsb. svensk Jordbr. Forskn., 1950, pp. 116-21.

When the central seed inspection institute was founded in 1925, it took over all the work carried out previously by some 15-20 local stations. The service was inaugurated as an aid to seed producers and growers, its chief concern being trueness to name of a variety or strain and freedom from disease. The functioning of the service in Sweden and its value to the industry are explained.

1272. GERM, H.

Über einige grundsätzliche Fragen der Gesundheitsprüfung des Saatgutes. (Fundamental problems of seed testing.)

Bodenkult., 1950, 4: 28-34, illus.

The newly reintroduced regulations [Austria, 1949] on seed testing are discussed.

1273. HAWTHORN, L. R., POLLARD, L. H., AND DRAPER, R. P.

A device for handling small experimental seed lots on a gravity separator.

Proc. Amer. Soc. hort. Sci., 1949, 54: 339-41, bibl. 1, illus.

An inexpensive accessory reducer frame is described and pictured, which can be attached to the deck of a gravity separator and makes possible the cleaning of amounts of seeds of carrots, lettuce, etc., less than $\frac{1}{4}$ lb. in quantity. Copies of a large-scale diagram showing detailed construction of the reducer can be obtained from the authors.—U.S. Dep. Agric. and Utah agric. Exp. Stat., Logan, Utah.

Noted.

1274.

a BENSON, A. A., AND CALVIN, M.

The path of carbon in photosynthesis. VII. Respiration and photosynthesis.

J. exp. Bot., 1950, 1: 63-8, bibl. 12, illus.

b BEVENUE, A., AND WASHAUER, B.

A study of the effect of clarification on the determination of reducing sugars in plant materials.

J. Ass. off. agric. Chem. Wash., 1950, 33: 122-7, bibl. 18.

c CAMP, W. H.

Proposals for changes in various portions of the international rules of botanical nomenclature dealing with genetically complicated groups and also with horticultural materials.

Amer. J. Bot., 1950, 37: 31-8.

d CLENDENNING, K. A., AND GORHAM, P. R.

Photochemical activity of isolated spinach chloroplasts in relation to reaction conditions.

Canad. J. Res., Sect. C, 1950, 28: 78-101, bibl. 27, being *Contr. N.R.C.* 2065.

e CLENDENNING, K. A., AND GORHAM, P. R.

Dark reactions of chloroplast suspensions.

Canad. J. Res., Sect. C, 1950, 28: 102-13, bibl. 6, being *Contr. N.R.C.* 2064.

- f CLENDENNING, K. A., AND GORHAM, P. R.
Photochemical activity of isolated chloroplasts in relation to their source and previous history.
Canad. J. Res., Sect. C, 1950, **28**: 114-39, bibl. 31, being *Contr. N.R.C.* 2069.
- g FESSENDEN, G. R.
Preservation of agricultural specimens in plastics.
Misc. Publ. U.S. Dep. Agric. **679**, 1949, pp. 78, bibl. 32+126, illus.
- h FINDLAY, S. P., AND DOUGHERTY, G.
The activity of certain substituted indole-acetic acids as plant hormones in the pea test.
J. biol. Chem., 1950, **183**: 361-4, bibl. 5.
- i FURTADO, C. X.
A further commentary on the rules of nomenclature.
Gdms Bull. Singapore, 1949, **12**: 311-77.
- j GERRETSEN, F. C.
Manganese in relation to photosynthesis. II. Redox potentials of illuminated crude chloroplast suspensions.
Plant and Soil, 1950, **2**: 159-93, bibl. 37.
- k HENRICI, M.
The transpiration of South African plant association. Part III. Indigenous and exotic trees in the Drakensburg Area.
Sci. Bull. Dep. Agric. S. Afr. **247**, 1945-6, bibl. 14, 6d. [received 1950].
Includes some wattles and shrubs.
- l HÖHN-OCHSNER, W.
Bericht über den Stand der floristischen Kartierung der Schweiz 1928-1948. (A report on the mapping of the Swiss flora 1928-48.)
Schweiz. bot. Ges., 1949, **59**: 473-5.
- m HOUSTON, F. G.
Microdetermination of iodine in plant material.
Anal. Chem., 1950, **22**: 493-4, bibl. 2.
- n JOHNSTONE, G. R.
Simplified equipment for subirrigation experiments in plant nutrition.
Plant Physiol., 1950, **25**: 185-6, illus.
- o KENTEN, R. H., AND MANN, P. J. G.
The oxidation of manganese by peroxidase systems.
Biochem. J., 1950, **46**: 67-73, bibl. 17.
Horseradish and turnip were materials used.
- p KLEMENT, R.
Schnelle und einfache Bestimmung kleiner Mengen Calcium. (A quick and rapid method for the determination of small quantities of calcium.)
Z. anal. Chem., 1948, **128**: 431-5, bibl. 3 [received 1950].
- q MARSH, R. H.
Soil moisture measurements by electrical resistance.
Yearb. Calif. Avocado Soc. for 1949, pp. 174-5.
- r VAN DER MERWE, J. H.
The spectrographic determination of zinc in plant material.
Sci. Bull. Dep. Agric. S. Afr. **277**, 1949, pp. 25, bibl. 18, 3d.
- s SCHARRER, K.
Beiträge zur Ermittlung kleinster Mengen von Bor und Kupfer. (The determination of small quantities of boron and copper.)
Z. anal. Chem., 1948, **128**: 435-42, bibl. 8 [received 1950].
In plant materials, fertilizers and soils.
- t SCHMID, E.
Prinzipien der natürlichen Gliederung der Vegetation des Mediterrangebotes. (Natural zones in the Mediterranean flora.)
Ber. schweiz. bot. Ges., 1949, **59**: 169-200, bibl. 43, coloured map.
- u STERGES, A. J., HARDIN, L. J., AND MACINTIRE, W. H.
A modification of the official micro method for the determination of phosphorus content of plant tissue.
J. Ass. off. agric. Chem. Wash., 1950, **33**: 114-21, bibl. 9.
- v STUMPF, P. K., AND LOOMIS, W. D.
Observations on a plant amide enzyme system requiring manganese and phosphate.
Arch. Biochem., 1950, **25**: 451-3, bibl. 3.
Isolated from sugar pumpkin seedlings.
- w U.S. PRODUCTION AND MARKETING ADMINISTRATION.
Grades, requirements, and regulations of the Secretary of Agriculture for carrying out the provisions of the export apple and pear act.
Serv. Regul. Announcement, U.S. Dep. Agric. **143**, revised 1950, pp. 7.
- x VARNER, J. E., AND BURRELL, R. C.
Use of C^{14} in the study of the acid metabolism of *Bryophyllum calycinum*.
Arch. Biochem., 1950, **25**: 280-7, bibl. 15.
- y WAIN, R. L.
Chemical aspects of plant growth-regulating activity.
Ann. appl. Biol., 1949, **36**: 558-63, bibl. 10.
A review.
- z WHITE, D. G., AND MECARTNEY, J. L.
Adaptation of punched cards for filing horticultural references.
Proc. Amer. Soc. hort. Sci., 1949, **54**: 215-24, illus.

TREE FRUITS, DECIDUOUS.

General.

(See also 1880, 2136, 2150, 2163, 2167, 2172.)

1275. JACKSON, F. W.

The fruit areas of America: New Jersey.*Amer. Fruit Gr.*, 1950, 70: 5: 14, 15, 34, 35, illus.

"Ever since New Jersey was settled about 300 years ago, abundant crops of fruit have been an outstanding feature of the State's agriculture." The most important varieties of fruit are listed, and acreages and production figures are given.

1276. GRÜNSEIS, F.

Möglichkeiten und Wege des österreichischen Obstbaues in der Zukunft. (**The future of fruit growing in Austria.**)

Bodenkultur, 1949, 3: 457-64.

Expansion is possible, but measures to improve quality must be adopted. They are discussed.

1277. LAPIÈRE, L.

Le Tyrol italien. (**Fruit growing in the Italian Tyrol.**)

Arbres et Fruits, 1949, No. 42, pp. 9-27, illus.

A general account, supported by many photographs, is given of methods employed in the Italian Tyrol, where the main crops are high quality dessert apples and pears, sometimes interplanted with grapes. Trees are grown as cordons, bushes and half-standards. In the past when cordons predominated, paradise, doucin and quince stocks were generally used, but to-day apple and pear seedlings are commonly used as rootstocks. Earlier orchards were generally planted too closely, and this led to the practice, in some cases, of transplanting intermediate apple trees that were 7-8 or even 12 years old. Irrigation is necessary, which results in surface rooting, and this has led to the practice of applying fertile mud from the banks of the river Adige as a form of mulch in circles round the trees. Varieties, fertilizers, spray programmes and harvesting are also described. For picking, a simple ladder is used consisting of a single pole with rungs passing through it, and supported on a base shaped like a horseshoe.

1278. LISAVENKO, M. A.

On the expansion of Siberian horticulture. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 1, pp. 3-11.

The advantages and disadvantages of the upright and the prostrate forms of apple for cultivation in Siberia are discussed. If quick returns are required, with least expenditure of labour and money, the quality of the fruit not being a serious consideration, upright trees are grown. If fruit of good size and quality is the primary importance then the prostrate form should be grown. Varieties for prostrate growing should have a natural somewhat drooping habit such as Mičurin's Pepin Šafrannyi, Pepin Kitaika, Šafran Kitaika, and, among the old Russian varieties, Pepin Litovskii. The successful culture of the prostrate form is guaranteed by the high insolation in summer and in winter the deep

protective layer of snow, which is essential also for bush fruit. The snow serves as a protection not only against frost but also against winter drought.

1279. PETRAHILEV, I.

The orchard district of Minusinsk. [Russian.]

Kolhoz. Proizv. (Collective farming), 1949, No. 8, pp. 24-5, illus.

A short account of fruit growing around Minusinsk, Siberia, where horticulture is an important part of the agriculture of the district. Reference is made to growing Mičurin's varieties of apple as prostrate, and standard varieties as upright trees. The growing period is short, for only about 100 days are without frost during the year. New varieties of apple, pear, plum, raspberry, and gooseberry are under trial; they show a high degree of frost resistance. Reference is made to plum-cherry hybrids.

1280. TUFTS, W. P.

The Californian apricot industry.

Proc. 63rd Conv. Amer. pomol. Soc., Yakima, Wash., Dec. 1948, 1949, pp. 147-56.

California with a yearly average production over 20 years of some 216,000 tons produces from 40 to 50% of the world apricot output. The chief varieties used are Royal, Blenheim, Tilton and Moorpark. Rootstocks include selections of apricot, peach, myrobalan and mariana plum stocks. Peach stocks are used on light, well-drained soils, apricot on moderately heavy but well-drained soils and plum on the wetter, heavier soils. Irrigation is used and cover cropping. Trees are planted 25 to 30 ft. apart. Pests and diseases to be controlled include brown rot, scales, crown borers and codling moth. The loss of export markets for both dried and canned apricots is very serious. The present varieties are not very suitable for freezing.

1281. HOARE, A. H.

The peach in England. 1. Historical. 2. Culture.

Agriculture, Lond., 1950, 57: 27-32, bibl. 8, and 82-6, bibl. 6, illus.

Part 1 is devoted to a brief account of the history of the peach and to lists of varieties of peaches and nectarines grown in England. Part 2 is concerned with its culture, particularly as an orchard crop. Experience gained and methods practised in two commercial orchards, one in Suffolk and the other in Hampshire, are outlined. In the former, the varieties Alexander, Duke of York, Peregrine and Bellegarde have proved the best, and in the latter Amsden June, Libra, Stirling Castle, Peregrine and Rochester. For rootstocks, peach is recommended, and, failing this, the plum stocks Malling St. Julien A, Brompton and Common Mussel, although with the last named Bellegarde is said to be incompatible. Pruning should be done at the bud-break stage in April or early May. Fruit thinning is best done in two stages, the first when the fruits are little larger than a pea and the second after the "stoning drop", after which the fruits should be at least 8 inches apart. Soils, manures, and pests are mentioned briefly.

1282. RUEF, J. U.

Peach culture [in Pennsylvania].

Circ. Pa agric. Ext. Serv. 350, 1949, pp. 20, illus.

Production and consumption figures indicate that there is still room for an increase in peach production in Pennsylvania. In this circular advice is given to the grower on choice of site and methods of planting, soil management, fertilizing, pruning and thinning. Notes are given on the principal peach varieties grown in the State and on a few of the newer varieties deemed worthy of trial.

1283. VERBELEN, V.

La culture du pêcher dans la région de Gelrode-Wezemaal. (Peach growing in the Gelrode-Wezemaal district [of Belgium].)

Rev. Agric. Brux., 1948, 1: 487-9 [received 1950].

A short account of the cultural methods practised in this peach growing district. Trees are grown on 3-ft. stems in the open. At present early varieties are worked mainly on seedling peach stocks which vary considerably. After the framework of the young trees has been formed, no pruning other than thinning is done unless, as after a hard frost, it is necessary to force the trees into growth.

1284. PAPAIOANNOU, P.

Olive industry in Cyprus.

Countryman, Nicosia, 1950, 4: 2: 13-14.

Although the yield of "Ladolia", the most widely grown olive variety, can average 10 okes* per tree with proper treatment, the average yield per tree in Cyprus is about 3½ okes. Suggestions for improvement include better water supplies, pruning, cultivation and the use of manures and the top-working of inferior types with improved varieties.

1285. EREMEEV, G. N.

Growing fruit trees in shelter belts. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 6-8.

In addition to the chief components of the shelter belts (oak, ash, etc.) and supplementary species such as maple and acacia, fruit trees (apricot, cherry plum, pear, apple, cherry, etc.) may be included. The fruit trees make best growth, in the southern dry regions of the U.S.S.R., if they are grown *in situ* from seeds and not transplanted. The apricot and cherry plum under such conditions yield fruit of good quality. Sowing in the dry southern regions can be carried out with dry seeds (without stratification) in the autumn. On heavy soil it is better to sow stratified seed in early spring.

Breeding and varieties.

(See also 1205, 1235, 1369a, b, c, g, h, 1372, 1428, 2145.)

1286. ALDERMAN, W. H., AND WEIR, T. S.

The fruit breeding farm report for 1949 [University of Minnesota].

Minn. Hort., 1949, 77: 133-4.

A short account of the 42 working years of this breeding

* 1 oke = 2.8 lb.

farm, during which time 58 fruit varieties and 3 ornamental trees have been introduced. Plans for future work are outlined, with special reference to the requirements of home orchards in Minnesota.

1287. DANIELSSON, B.

Embryokulturer av fruktträd. (The culture of fruit tree embryos.)

Årsb. svensk Jordbr. Forskn., 1950, pp. 96-8.

A discussion of different methods, but especially of that worked out by Lammerts (*H.A.*, 12: 764). At Balsgård the culture of cherry embryos has received the greatest attention, but peach and plum embryos are also cultured.

1288. MACHERAUCH, O.

Sortenbeschränkung für Obstgewächse. (The limitation of fruit varieties [in Germany].)

Dtsch. Baumsch., 1950, 2: 97-9.

The Varietal Registry for Crop plants has published its first official list of fruit varieties. This order limits, as from named dates, the marketing of currants, gooseberries and strawberries to certain named varieties.

1289. SPIRINA, V. V., AND MEDVEDEV, P.

Apples in the eastern part of the Vologda province. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 14-18, illus.

The apple varieties in the Vologda province (continental climate with long winter) are selected for their short growing period. Six of the selected hybrid varieties are described, one of them a "vegetative hybrid" raised in Siberia by grafting a cutting of a European variety in the head of a Siberian variety. It is said to be of dessert quality; its "cycle of phenological development" is about 160 days, the fruit ripening towards the end of September, and it is satisfactorily fruitful and resistant to frost.

1290. LOEWEL, E. L., AND VAHL, E.

Die Lemonenrenette. (Lemon pippin.)

Mitt. ObstbVersuchsring, Jork, 1950, No. 1/2, pp. 6-7.

A Dutch variety which is becoming popular in the Altenland near Hamburg. It is similar to Belle de Boskoop, has certain advantages over it, but cannot be regarded as a substitute for it.

1291. GLACKENS, I.

The Jefferis apple.

Fruit Var. hort. Dig., 1949, 4: 103-5, illus.

The Jefferis apple was first exhibited in Pennsylvania in 1848, but was neglected till recently. The fruit has a fine yellow flesh and refreshing flavour, the tree is widely adaptable and easy to grow. It is suggested for the home orchard as a bush or cordon on Malling IX stock.

1292. SCHAEER, E.

Die Strauwalds Parmäne, ist sie empfehlenswert? (The apple variety Strauwald's Pearmain.)

Schweiz. Z. Obst- u. Weinb., 1950, 59: 133-5.

An illustrated description is given of the variety Strauwald's Pearmain, which is said to combine the

quality of Goldparmäne [King of the Pippins] with a much greater resistance to disease and to be a likely successor to it as a popular dessert apple in many parts of the Continent. Russetting and a tendency to shrivel detract from its appearance.

1293. ANON.

Chance for new fruit growers ?

Fruitgrower, 1950, **109**: 518-20, illus.

The Westmorland Damson, grown mainly in South Westmorland, is a much neglected variety, that the local growers claim is quite distinct in fruit character and flavour from the Prune Damson (with which it is identified by H. V. Taylor in *The plums of England*). As a result of its unique flavour, there is a large unsatisfied market for this variety, especially among processors. There are also large areas of Westmorland suitable for its culture, and the possibility of establishing a valuable local damson industry is here considered. The trees will grow satisfactorily on very shallow soil, even among limestone outcrops. Locally they are grown in grass orchards grazed with stock, or as hedges. The variety is readily propagated from suckers. Some variation in tree type and fruit form exists, but an attempt at selection is being made and fruit trials are being carried out.

1294. HOUGH, L. F., AND BAILEY, C.

New Jersey peach varieties.

Fruit Var. hort. Dig., 1949, **4**: 87-9.

The 21 newly named peach varieties from the New Jersey Agricultural Experiment Station give a succession of yellow and of white varieties ripening over more than 2 months.

1295. MERRILL, G.

Two new peaches for California.

Fruit Var. hort. Dig., 1949, **4**: 90-1.

Two new, strong growing peach varieties, Merrill Gem and Merrill Beauty, produce fruit of large size, high colouring and firm flesh.

1296. HEWETSON, F. N.

Good peaches, canned or frozen.

Science for the Farmer, Suppl. 1 to Bull.

515 (62nd A.R. Pa agric. Exp. Stat.), 1950, pp. 9-10.

Results of tests carried out by the South Mountain Fruit Research Laboratory, Arendtsville, show that the quality of many of the newer varieties of peaches is superior, for canning and freezing purposes, to that of the older ones. In canning tests Triogem, South Haven, Sunhigh, July Elberta and Halehaven gave outstandingly good results. Golden Jubilee, on the other hand, did not hold its shape and was ragged and rather tasteless. In the freezing tests, July Elberta, Triogem and Sunhigh were again placed high on the list for quality, while Golden Jubilee came last. In thawing tests, Golden Jubilee, Sunhigh, July Elberta, Midway, Triogem, South Haven and Pacemaker showed little or no browning after 18 hours; but other varieties tested were quite brown and unusable after the same period.

1297. EVREINOFF, V.-A.

Les pêcheurs d'ornement. (Ornamental peaches.)

Rev. hort. Paris, 1949, **121**: 93-6, bibl. 7, illus.

Descriptions are given of the tree, flower and fruit characters of a dozen ornamental peaches which have edible fruit, some of them of very good quality.

1298. DRAGOZINSKAJA, V. M.

Interspecific hybrids of the Chinese pear with European varieties. [Russian.]

Agrobiologija (Agrobiology), 1949, No. 4, pp. 115-18, illus.

An account is given of crossing experiments between forms of the Chinese pear (*Pyrus serotina*) and European varieties. Four hybrids, selected as showing promise, are being propagated vegetatively for distribution to different regions for variety trials. They are described and two of them illustrated. All four are stated to be quite resistant to scab.—Maikop experiment station, Krasnodar.

1299. KUZNECOV, V. V.

Promising varieties of quince in Uzbekistan. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 1, pp. 29-31, illus.

In the Fergan valley, Uzbekistan, quinces are grown fairly extensively, particularly along irrigation canals. The fruit is used fresh or processed. Seven varieties are described, with drawings of the fruit of three of them. Propagation, only mentioned for one variety, Nordon, is said to be by root suckers, rarely by grafting.

1300. CAILLAVET, H.

Les variétés de prunes de table. (Dessert plum varieties.)

Rapports présentés au 2^e Congrès national de la prune et du pruneau, Agen, 1948, in *Bordeaux et le Sud-Ouest*, 1949, **30**: 1: 78-81, illus.

From observations made primarily on an extensive collection of commercial plum varieties grown at the Station de Recherches d'Arboriculture fruitière, at Bordeaux, the author has selected some 20 varieties that he considers to be outstanding as commercial dessert plums. He describes their chief pomological characteristics.

1301. BARRET, J.

L'origine du pruneau d'Agen et du prunier d'Ente. (The origin of the d'Agen prune and the d'Ente plum.)

Rapports présentés au 2^e Congrès national de la prune et du pruneau, Agen, 1948, in *Bordeaux et le Sud-Ouest*, 1949, **30**: 1: 33-5.

A historical account of the origin and commercial development of the d'Ente plum, which has been grown in the Agen district since the sixteenth century and the fruits of which, in their dried form, make the famous d'Agen prunes. Recent work on the selection of parent trees for propagation purposes has done much to improve the quality of the product.

1302. ALMEIDA, J. L. F. DE.

Sobre a cariologia de *Prunus lusitanica* L. (The cytology of *Prunus lusitanica* L.)

[English summary $\frac{1}{2}$ p.] *Agron. lusit.*, 1947, **9**: 129-39, bibl. 15, illus. [received 1950].

Prunus lusitanica is an octoploid, $2n=64$, being $x=8$.

It is considered to be an alopolyloid, of ancient origin, behaving as a "functional diploid".

1303. BERNHARD, R.

Selection des variétés de prunes de séchage utilisées dans le Sud-Ouest. (Selection of varieties of drying plums grown in the South-West [of France].)

Rapports présentés au 2^e Congrès national de la prune et du pruneau, Agen, 1948, in Bordeaux et le Sud-Ouest, 1949, 30: 1: 62-4, 73-5, illus.

An account of the work done at the Station de Recherches d'Arboriculture fruitière du Sud-Ouest, Bordeaux, in sorting out the mixed population of the d'Ente plum, widely used in France for drying purposes. As a result of trials held in 1943-46, in which 31 samples of large-fruited types were studied, 3 (referred to as Prune d'Ente A, B and C) were selected as being most suitable for future propagation. Their pomological characters are described. The characters of the sub-varieties of the d'Ente plum, and of the principal American varieties of drying plums, also collected at the station, are compared with those of the d'Ente plum.

1304. BIASCO, A.

Sulle varietà di olivo coltivate nel Leccese. (Olive varieties cultivated in the neighbourhood of Lecce [extreme S.E. of Italy].)

Humus, 1949, 5: 11: 9-12.

An account of the two very old olive varieties, Ogliarola and Cellina, being those most commonly grown in the heel of Italy. Their great differences in growth necessitate different manurial treatments, which are described.

Propagation and rootstocks.

(See also 1206, 1260, 1299, 1369j, k, 1659, 2130.)

1305. SALYNSKIĖ, F. S.

The early transplanting of seedlings. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 11-13.

Early transplanting of apple and pear seedlings (end of April and beginning of May) gives much better results than later planting, with a survival of 97% as against 65-75% when done in the middle of May and later. With seeds sown in heated beds stratification should be started 12-18 days earlier than when the seed is to be sown in open ground. Sawdust is recommended as a mulch for the young trees in dry, hot weather, for it retains moisture and protects soil and plants from the sun's heat.

1306. WENZL, H.

Schichtdicke und Wirkungsweise von Baumpflegemitteln. (Vorläufige Mitteilung.) (Thick or thin wound dressings. Preliminary communication.) [English summary 6 lines.]

PflSch. Ber. Wien, 1950, 4: 57-9, bibl. 2.

A pitch wax wound dressing used in a thin layer, of not more than 0.6 mm., promotes healthy tissue formation in cherry and plum trees and is much preferable to a thick one.

1307. TUKEY, H. B., AND CARLSON, R. F.

Five-year performance of several apple varieties on Malling rootstocks in Michigan.

Proc. Amer. Soc. hort. Sci., 1949, 54: 137-43, bibl. 4.

Eighteen stock-scion combinations of apple trees on Malling rootstocks, involving 180 trees, responded favourably to growing conditions in Michigan on a relatively light soil and during two drouthy seasons. They grew vigorously and developed and fruited in about the same relationships as observed in other locations in the eastern United States. In size, the largest trees were those on Malling XII, followed in descending order by Malling XIII, then by a group comprising Malling V, IV, I, and II, with trees on Malling VII the smallest. Blossoming and fruiting precocity was in reverse order, with the earliest bearing on the Malling VII rootstock, followed by Malling I and II, which in turn were followed by Malling IV, V, and XIII, with Malling XII the most tardy. Malling XIII appeared a precocious rootstock for Golden Delicious but relatively less so for Cortland. Malling VII produced both small and early-bearing trees which are more substantial than trees on Malling IX. Cropping is associated with the bearing habits of the variety, in which McIntosh bears heavily on strong spur development and Cortland less heavily on terminals. [Authors' summary.]

1308. SUDDS, R. H.

Sixteen years' results of orchard tests with apple trees on selected rootstocks, Kearneysville, W. Va.

Proc. Amer. Soc. hort. Sci., 1949, 54: 144-8, bibl. 2.

Additional results are given [for earlier report see H.A., 17: 1193] for 4 apple varieties grown on M. I, XIII and XV, U.S. clones 313, 316, 317, 323 and 329 and open-pollinated seedlings of 8 commercial varieties and French Crab. With 329 as a standard, only 316 has given a similar, and in one case a better, yield. With the other stocks there has been much variation as between the four scion varieties. The results throw doubt on the wisdom of using seed from northwestern by-products plants, as both of the main varieties used there, Delicious and Winesap, have been generally inferior to 329, as has French Crab.—West Virginia Univ.

1309. BUDAGOVSKIĖ, V. I.

Yield and quality of the fruit of apple trees in relation to the type of dwarfing rootstock. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 7-12.

A study of the relative yield and the storage qualities of the fruit of apple trees on numbered [? East Malling types] rootstocks on State farms in the Crimea and in the Kuban province of Russia. The results obtained, with four commercial varieties on types II, III, V and VIII, and on wild crab rootstocks are described and tabulated.

1310. LAPIÈRE, L.

La greffe en pont. (Bridge grafting.)

Arbres et Fruits, 1950, No. 47, pp. 3-11, illus.

A general, well-illustrated article on bridge grafting of fruit trees, the trunks or surface roots of which have been girdled by animals.

1311. PAPAIOANNOU, P.

Olive grafting and budding.

Countryman, Nicosia, 1950, 4: 4: 11-13.

Methods described are patch budding, inserting the patch into a T or inverted T or I-shaped cut in the stock, and cleft, bark, and side-bark grafting. In selecting scion material care must be taken to avoid trees infected with the olive knot disease, *Bacterium savastanoi*.

1312. MORT, C. H.

Olive tree propagation. Review of exploratory trials conducted at Wagga Agricultural College and Experiment Station.

Agric. Gaz. N.S.W., 1949, 60: 633-4; 1950, 61: 26-9, bibl. 4, illus.

Olive trees can be propagated in many ways. Budding and grafting of seedlings give most consistent results, shield budding in January or February being most satisfactory. "Whip and tongue" grafting yields good results, but early growth is more vigorous if side grafts are used. Root grafting can be used successfully. Glasshouse conditions are necessary for striking tip or light semi-hardwood cuttings. Heavy hardwood cuttings are easier to strike, but only a few can be obtained from any tree. Propagation by layering and stooling has been successful. Treating cuttings with naphthaleneacetic acid, indolylbutyric acid, sucrose, vitamin B, and other chemicals has not given consistent results; treatment with indolylbutyric acid at 40 p.p.m. has been the most promising so far.

1313. SOUTY, J.

Les porte-greffes du prunier. (Plum rootstocks.)

Rapports présentés au 2^e Congrès national de la prune et du pruneau, Agen, 1948, in Bordeaux et le Sud-Ouest, 1949, 30: 1: 57-61, illus.

After reviewing the work that has been done on rootstock influence in connexion with plums, the author gives the origins and characteristics of the various stocks used in France and elsewhere, and discusses the programme of the Station de Recherches d'Arboriculture Fruitière du Sud-Ouest for increasing the homogeneity of the very variable material available, either by establishing genetically pure lines of certain desirable stocks, or by the vegetative propagation and testing of selected individuals. The first line of approach has so far only succeeded with the peach stock. For purposes of the second, suitable methods of propagation for selected stocks are being investigated.

1314. BERNHARD, R.

Le pêcher-amandier et son utilisation. (The peach-almond hybrid and its uses.)

Rev. hort. Paris, 1949, 121: 97-101, bibl. 13, illus.

The origin and location of several specimens of peach-almond hybrid are recorded. The hybrids are usually fertile, although the progeny show great variation. In former times, selected types, chosen for their large, deeply coloured flowers and profuse habit of flowering, were grown for ornament or for the manufacture of

dried flowers. The trees are generally very vigorous, long-lived, hardy and tolerant of poor soil conditions. For the sake of these qualities, they have sometimes been used as rootstocks for peach or almond with good results. In 1938 a study of the value of these hybrids for use as rootstocks was begun at the Station de Recherches d'Arboriculture Fruitière de Sud-Ouest. Among the various naturally occurring types and their progeny, immense variation was found and a careful selection was made. Vegetative propagation proved very difficult, but one especially vigorous type was found to root readily from layers. The performance of this type as a rootstock is now being studied. The possibility of using the peach-almond hybrid as an intermediate stock for peach on roots of peach seedling is also being investigated.

1315. SOUTY, J.

Les porte-greffes du pêcher et du prunier. (Peach and plum rootstocks.)

[*Publ. Stat. Rech. vitic. Arbor. fruit. Sud-Ouest (I.N.R.A.)*] B.T.1.41, 1949, pp. 9, illus.

After a short introduction to grafting and the stock/scion relationship, notes are given on the following species in relation to their suitability as rootstocks for peach and plum trees: *Prunus persica*, *P. amygdalus*, hybrids of peach and almond, *P. armeniaca*, *Persica davidiana*, *Prunus insititia*, *P. domestica*, *P. cerasifera*, *P. spinosa*, and *P. besseyi*.

1316. KÜPPERS, H., AND HILKENBÄUMER, F.

Selektion von Vogelkirschen (*Prunus avium*) als Kirschen-Unterlage. (Selection of *Prunus avium* for cherry rootstocks.)

Züchter, 1949, 19: 333-43, bibl. 18.

and

Bereitstellung von frosthärteren Vogelkirschen als Kirschenunterlagen. (Raising frost resistant *Prunus avium* rootstocks for cherries.)

Dtsch. Baumsch., 1950, 2: 50-5.

Results of work carried out since 1935 by the Institute of Horticulture, Halle University, in conjunction with the Hüttner nurseries, Altenweddingen, Central Germany. The following conclusions were based on observations on *Prunus avium* trees grown from seed obtained from Limburg, Holland, or from trees in Central Germany. (1) Vegetative vigour measured by stem diameter was of little significance. (2) Severe frost brought out considerable differences in frost hardness of the individual mother-trees. Some connexion between frost damage on the stems and gumming was observed. No correlation was found between colour of bark, bark structure, frost resistance and gummosis. (3) It was possible to select trees with typical pyramidal growth or with extreme drooping sweet-cherry-like growth. (4) Blossoming time fluctuated between the 3rd and 7th "cherry week"; the majority, however, flowered midseason. (5) Size of fruit differed considerably, though the largest fruits were smaller than small sweet cherries. Colour, taste and yield showed considerable variation. (6) Stones varied considerably in size and yield. No proof of correlation between colour of fruit, size of fruit, colour and health of stem was obtained. (7) The percentage of germination of the progenies of 40 preselected trees varied between 4.3 and 95.6%, most being midway

between these two points. An important factor for selection is that the germination results for various years were stable. (8) The annual growth of shoots varied from 21.8 to 44.8 cm. average length. (9) Saleable trees showing good sweet cherry scion growth varied from 56.3 to 92.4%. (10) This examination of mother-trees and their progenies has revealed considerable variation, and the possibility of selection of valuable forms has been proved.

1317. DOMINIK, T.

Występowanie mykorhizy u dzikich drzew owocowych rosnących w lesie. (*Mycorrhiza in wild fruit trees growing in forests.*) [French summary.]

Acta Soc. Bot. Polon., 1948, 19, 2, pp. 169-87, illus., from abstr. in *Rev. appl. Mycol.*, 1950, 29: 167.

Microtome sections showed that *Pyrus communis* subsp. *piraster* and wild cherry (*Prunus avium*) had abundant ectotrophic and endotrophic mycorrhiza, the former preponderating. *Malus communis* subsp. *silvestris* had ectotrophic, endotrophic and peritrophic mycorrhiza, all fairly equally distributed. So far investigations have indicated that cultivated fruit trees have only endotrophic mycorrhiza.

1318. HERR, F.

Die Obststammbildner. (Stem builders for fruit trees.)

Dtsch. Baumsch., 1950, 2: 61-5.

Good stem builder apple, pear and plum varieties are listed and their characteristics, with special reference to frost resistance, under German conditions are described.

Pollination.

1319. VAHL, E.

Die Befruchtungsverhältnisse der wichtigsten Obstsorten der Niederelbe. (The pollination of the most important fruits of the lower Elbe.)

Mitt. ObstVersuchsring, Jork, 1950, No. 7/8, pp. 43-6.

The pollination requirements of apples, pears, plums, sweet and sour cherries and their respective varieties are pointed out.

1320. BLAHA, J.

Opylování a oplozování ovocných stromů. (Fertilization and setting of fruit trees.)

Tiskárna Zář, Brno, 1948, pp. 74, bibl. 14, illus. [received 1950].

With a view to re-establishing fruit production in Czechoslovakia after the disastrous winter of 1947, factors favourable to pollination are described and lists are given of suitable pollinators for the more important fruit varieties.

1321. BULLOCK, R. M., AND OVERLEY, F. L.

Handling and application of pollen to fruit trees.

Proc. Amer. Soc. hort. Sci., 1949, 54: 125-32, bibl. 3, being *Sci. Pap. Wash. agric. Exp. Stat.* 820.

Aeroplane pollination of Delicious apples applied two

years as a dust mixture permitted excellent germination of pollen but did not increase fruit set over natural pollination. Germination following bomb application was very low for reasons unknown. Studies on 37 pollen diluents showed three materials to be outstanding and of equal merit for maintaining viability in storage, namely powdered milk (non-fat), egg albumen and lycopodium.—Tree Fruit Exp. Stat., Wenatchee, Wash.

1322. GRIGGS, W. H., AND VANSSELL, G. H.

The use of bee-collected pollen in artificial pollination of deciduous fruits.

Proc. Amer. Soc. hort. Sci., 1949, 54: 118-24, bibl. 6.

Laboratory tests showed that freshly gathered bee pellets of almond, cherry and pear pollen dissolved in 15 or 20% syrup germinated as well as or better than hand-collected pollen. Applications of bee-collected pollen in water and syrup mixtures to Hardy and Bartlett pears, however, produced negligible sets of fruit, although with Lambert cherry and Delicious and Golden Delicious apples satisfactory sets were obtained under favourable weather conditions. Further study is needed before bee-collected pollen can be recommended for commercial artificial pollination.—University of California.

1323. ANDERSON, E. J., AND CLARKE, W. W., Jr.

Beekeeping in Pennsylvania.

Circ. Pa agric. Ext. Serv. 357, 1950, pp. 54, illus.

Includes a section on bees kept for pollination (pp. 47-50), in which suggestions are made for ensuring that colonies kept for this purpose are exceptionally strong at the time of blossoming, and for siting to minimize risks of spray poisoning.

1324. STADLMANN, A.

Ist die Biene bei der Befruchtung der Apfelblüte notwendig? (Bees and apple pollination.)

Mitt. ObstVersuchsring, Jork, 1950, No. 9/10, p. 60.

During an experiment in the Jork district with the self-sterile apple variety Allington Pippin, pollination by wind proved unsatisfactory and the importance of bees as pollinators is stressed.

1325. TATARINCEV, A. S., AND OSTROUHOVA, N. V.

Storing pollen of tree and bush fruits. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 3, p. 23.

Tests were made on the storage of viable pollen of fruit trees with calcium chloride, powdered wood charcoal, and common salt as dehydrating agents to keep the pollen dry. Calcium chloride gave the best results, wood charcoal was rather less effective, while the use of salt was no better than drying in the open air. It is recommended, therefore, that when calcium chloride is unobtainable wood charcoal should be used.

1326. GOLUBINSKII, I. N.

The effect of the corolla on the germination of pollen grains. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 19-21.

Increased germination of pollen grains of fruit trees (wilding apples and pear, birdcherry and blackcurrant) and length of pollen tubes were obtained, by (1) placing petals in the solution used for germination, (2) supporting the vessels used in the germination tests among flowers on the trees, particularly of the same species. It is concluded that pollen germination is stimulated by the aromatic substances secreted by the petals.

1327. BRADFORD, F. C., AND BRADFORD, R. H.
Pollination of native crab apples of the northeastern United States.
Proc. Amer. Soc. hort. Sci., 1949, **54**: 133-6, bibl. 8.

Studies are reported on fruit set and seed numbers of varieties of *Malus platycarpa* and *M. coronaria* (?) pollinated with pollen from the same two species and from *M. ioensis*, *M. sylvestris*, *M. baccata* and from common apples.—U.S. Dep. Agric., Maryland.

1328. OSBORNE, D. J.
Attempts to produce parthenocarpic pears with growth substances.
Ann. appl. Biol., 1949, **36**: 551-3, bibl. 3.

Parthenocarpic fruits of Pitmaston Duchess produced by spraying emasculated flowers with α -(2-naphthoxy)-propionic acid appeared quite normal, while those of Dr. Jules Guyot were somewhat smaller than normally fertilized fruits and rather plum-shaped. The pips from the parthenocarpic fruits from both varieties were small and flattened and contained no embryos.—Wye College.

1329. BERNHARD, R., DELMAS, H. G., AND SANFOURCHE, G.
La pollinisation du prunier. (Pollination of the plum.)
[*Publ. Stat. Rech. vitic. Arbor. fruit. Sud-Ouest (I.N.R.A.) B.T.I.*, **41**, 1949, 7pp., illus.

After an introduction on self-fertilization and cross-fertilization the results are given of using a number of varieties for pollinating Coe's Golden Drop, Reine Claude, and a variety of Mirabelle Dorée without functional pollen. A table shows the relative periods of flowering (from start to full blossom) of 20 varieties observed during five years at the Station de Recherches Viticoles et d'Arboriculture Fruitière du Sud-Ouest.

1330. CRANE, J. C., AND BLONDEAU, R.
Controlled growth of fig fruits by synthetic hormone application.
Proc. Amer. Soc. hort. Sci., 1949, **54**: 102-8, bibl. 17.

In trials in California in 1948 on the Calimyrna fig, unpollinated syconia sprayed with 25 p.p.m. 2,4,5-trichlorophenoxyacetic acid were mature 15 days afterwards, the total growing period being thus reduced from an average of 120 days to about 60 days. Fruits were normal as regards size, colour and sugar though devoid of achenes. Similar acceleration of fruit development was induced in pollinated Calimyrna figs and parthenocarpic Mission fruits. Other concentrations of 2,4,5-T produced similar responses, but even at 10 p.p.m. severe leaf chlorosis occurred, while at 75 and 100 p.p.m. branches died about 1 month after treatment. It is suggested that the data support the hypothesis that cyclic growth of the fig fruit is

controlled by variation in supply or activity of a hormone produced within the fruit itself.

1331. BLONDEAU, R., AND CRANE, J. C.
Further studies on the chemical induction of parthenocarp in the Calimyrna fig.
Plant Physiol., 1950, **25**: 158-68, bibl. 7, illus.

In their preliminary investigations [see *H.A.*, 19: 137] the authors found that an application of indolebutyric acid would produce a parthenocarpic fruit set of the Calimyrna fig equal to, or better than that of the caprifig controls. In further investigations, reported here, 9 growth regulating chemicals were tested to determine their effectiveness in inducing parthenocarp in this fruit. Of these chemicals, indolebutyric, naphthaleneacetic, 2,4,5-trichlorophenoxyacetic, and para-chlorophenoxyacetic acids gave good results. Effective and toxic concentrations were determined. Because of its low cost, the low dosage required and its lack of injurious effects, para-chlorophenoxyacetic acid appears to offer considerable promise as a means of eliminating the problems of caprification in the Calimyrna fig industry. The flavour and colour of the fresh parthenocarpic fruit was equal to that of the caprifig controls. The flavour of the dried fruit was generally acceptable, but milder and somewhat different from that of caprifig fruit. 2,4,5-trichlorophenoxyacetic acid had the additional advantage of accelerating fruit maturation [see also *H.A.*, 19: 891 and abstr. 1330 above]. Syconia sprayed with this material matured 2 weeks after treatment, while caprifig fruit required 75 days. It also accelerated maturation of caprifig fruit and of the normally parthenocarpic fruit of the Black Mission variety.—Shell Oil Co., Modesto, Calif., and University of California, Davis.

Growth and nutrition.

1332. STAEHELIN, M.
L'alternance de la production chez les pommiers. (Biennial bearing in apples.)
Progr. agric. vitic., 1950, **133**: 177-81.

The author discusses the factors influencing the initiation of fruit buds in relation to biennial bearing, and refers to trials in America and in France for the thinning of flowers by the application of chemicals. In an experiment described he showed that the application of α -naphthaleneacetic acid at 50 p.p.m. to Belle de Boskoop trees in bloom caused all the flowers to drop without setting, and he warns growers of the danger incurred in adopting measures which have not been thoroughly tested in their own region.

1333. HALLER, M. H., AND SMITH, E.
Evaluation of indexes of maturity for apples.
Tech. Bull. U.S. Dep. Agric. **1003**, 1950, pp. 53, bibl. 42.

Earlier work in this field was repeated in a series of experiments begun in 1938, in locations ranging from Maryland to Oregon. Criteria for satisfactory determination of maturity are suggested. Measurements were made of ground colour, firmness, ease of separation, starch pattern and period between blossoming and maturity in a number of commercially important varieties. Alteration of ground colour was too gradual

and firmness measured by pressure test was also found to be unsatisfactory. No significant correlation could be found between maturity and ease of separation. The variation in starch pattern at maturity was found to be too great for it to be of use as an index. The period required to attain maturity from full blossoming was found to be fairly uniform for a given variety under widely differing climatic conditions and this is suggested as the most reliable index of maturity. Temperatures appear to have less effect on development and maturation time in apples than in other fruits investigated, but this period was found to be shortened where the crop was relatively light, and vice versa. Recommendations are made as to the most satisfactory period from blossoming to different degrees of maturity for a number of varieties. Factors influencing resistance to storage scald are also discussed.

1334. HARTMANN, H. T.

Growth of the olive fruit.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 86-94, bibl. 8.

Measurements of the Manzanillo olive in the 1946 season, of the Mission olive in the 1947 season and of these varieties and the Ascolano olive in the 1948 season showed cyclic behaviour typical of other drupaceous fruits; a period of rapid growth was followed by a period of reduced rate of growth which in turn was followed by a period of rapid increase in growth rate. The Mission olive in 1947, however, was an exception in that there was a second period of depressed growth followed by a further period of faster growth due to oil accumulation in the December and January.—Univ. of Calif.

1335. JUDKINS, W. P., AND WANDER, I. W.

Correlation between leaf color, leaf nitrogen content, and growth of apple, peach, and grape plants.

Plant Physiol., 1950, **25**: 78-85, bibl. 10.

A method of determining leaf colour by the use of a photoelectric reflection meter is discussed. Data are presented which show significant positive correlations between leaf nitrogen content and leaf reflectance of peach, grape and apple plants, and between leaf nitrogen and dry weight of the shoots of the same plants, except in the case of Cortland and Stayman Winesap apples. "The results demonstrate that leaf reflectance determinations obtained with the photoelectric reflection meter may be a useful and time saving substitute for nitrogen determinations in estimating the amount of nitrogen fertilizer to be applied to apple, peach or grape plants." The reflectometer used in this study appeared to be superior to colour charts as a means of determining the intensity of the green colour of leaves.—Ohio agric. Exp. Stat., Wooster, and Citrus Exp. Stat., Lake Alfred, Fla.

Pruning, training and thinning.

1336. HILKENBÄUMER, F., MEIER, G., AND REICHEL, M.

Schnitt der Obstgehölze mit Umveredlungsverfahren. (The pruning and re-working of fruit trees.)

Neumann Verlag, Radebeul, Berlin, 1950, 4.7×6.6 in., pp. 144, illus.

The booklet is another publication in the series "Zweckmässige Arbeitsweise im Obstbau" (practical fruit growing), in which Hilkenbäumer's *The raising of fruit trees* appeared in 1949 [*H.A.*, 20: 1161]. Again illustrations are the chief means of instruction, the introduction of a second colour to indicate the shoots that are to come out or to be cut back being a great improvement. The pruning of small fruit is also dealt with.

1337. WENZL, H.

Schnittführung und Wundüberwallung bei Obstbäumen. (Callusing over of pruning wounds in fruit trees in relation to the angle of cut.)

Bodenkultur, 1949, **59**: 535-49, bibl. 7, illus.

From observations on the callusing over of pruning wounds in several large orchards the author comes to the conclusion that in their work pruners are fortunately guided not so much by complicated textbook instructions as by their own sound instinct, which tells them that the smallest cut will callus over most easily. An angle of cut of 10-20° with the axis of the branch that is left and an angle of 120-130° with the axis of the shoot to be pruned seems, on the whole, to have been most favourable for rapid healing over, though variety and vigour of tree will influence the optimum angle. The points made by the author are clearly illustrated by drawings.

1338. CARDINELL, H. A.

The "wedge" method of pruning the apple.

Quart. Bull. Mich. agric. Exp. Stat., 1950, **32**: 419-30, bibl. 4, illus.

The wedge or clover leaf type of pruning involves opening up the tree on 4 sides to give access to the centre for spray nozzles, etc. In a trial on 12- to 14-year-old Red Delicious apples that had not previously been pruned, the cutting of 4 V-like wedges down to the main branch structure increased yields as compared with unpruned control trees and reduced the tendency towards biennial bearing. There was a slight improvement in size of fruit, but neither in size nor colour were fruits as good as those from trees that had received conventional pruning throughout.

1339. JAIVENOIS, A.

Taille de formation des arbres à basses tiges en formes libres. (Pruning to form open centre bush trees.)

Fruit belge, 1950, **18**: 57-61, 76-8, illus.

The characters of a well-shaped bush fruit tree are enumerated and then various types are described, for apple, viz. the open centre and its Swiss modification, the German "Hochbusch" the "delayed open centre" and the spindle bush, and for pear, the classical pyramid, and the spindle.

1340. BERESNEV, A. E.

More on prostrate fruit trees. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 3-6.

A critical review of the conclusions of previous workers on the difficulties and failures in growing prostrate fruit trees in Siberia. The author admits that such trees demand greater care than those grown with upright stems, and advises the use of Mičurin and

central Russia varieties, rather than the Siberian varieties for growing as prostrate trees.

1341. GOUDREAU, P.

La taille du pommier. (The pruning of apples.)

Arbres et Fruits, 1949, No. 44/45, pp. 49-58.

This article would appear to be based on a longer article on pruning, but the reference is not given. The pruning of apples is discussed under the headings: definition, aims, advantages, principles and execution. Certain studies are described to support the recommendations. In one, fruits from different parts of trees were measured and weighed separately; the amount of fruit produced apically was greater than that produced in the outer part of the tree, and both these were much greater than the quantity produced in the centre. In another, yields of high quality apples from lateral shoots with a diameter exceeding $\frac{3}{8}$ in. were found to be ten times that of branches of less than $\frac{1}{4}$ in. and three times that of intermediate shoots. Experiments in Michigan indicate the advantage of removing slender laterals.

1342. WHITE, D. G.

Brush rake cuts labor costs.

Amer. Fruit Gr., 1950, 70: 3: 24, illus.

With the spring-tooth rake described and illustrated "the brush from moderate pruning of mature apple trees is raked from beneath the trees into stacks between rows at the rate of one tree per minute".

1343. RENAUD, M.

Quelques directives techniques pour la mise en valeur des oléastres. (Suggestions for improving wild olives.)

Fruits et Prim., 1949, 19: 342-4.

Recommendations are made for thinning out overcrowded patches of wild olives, provided these are growing on suitable soil, followed by top working, pruning and cultivation.

1344. CANADA, DEPARTMENT OF AGRICULTURE.

New methods of thinning peach trees in Essex county.

[*Mim. Publ.*] *Inf. Serv. Dep. Agric. Canada*, 1950, pp. 2.

Peach blossom thinning trials with Elgetol sprays (20% sodium-dinitro-ortho-cresol) carried out during the last few years at the Dominion Experimental Station, Harrow, Ont., gave very variable results. A relative humidity of 85% or more with temperatures below 65° F. was found to be needed for satisfactory thinning. A method of fruit thinning by means of a club in late June and during July proved promising. It was not only cheaper and more rapid than hand thinning, but the trees benefited from the early removal of excess fruit. Eighteen in. of $1\frac{1}{2}$ -in. hose placed on the end of a 4-ft. stick made an excellent club. Branches are hit sharply with the club at right angles until the desired amount of fruit falls.

1345. ANON.

L'éclaircissage. (Fruit thinning.)

Arbres et Fruits, 1949, No. 44/45, pp. 40-9.

The objects and methods of fruit thinning are discussed with special reference to American experience with apples and peaches. A comparison of thinning by

hand with spray thinning with Elgetol [apparently in France] showed a 70% saving in cost from the latter.

Manuring and soil management.

(See also 2151.)

1346. ANON.

La fumure des arbres fruitiers. (The manuring of fruit trees.)

Arbres et Fruits, 1949, No. 40, pp. 16-18, and No. 44/45, pp. 26-33.

The first part of this article consists of a brief general account of the use of nitrogen, the second is a reprint of a paper by D. Mulder on minor elements which originally appeared in *Fruit belge*, 1949, 17: 67-72, and is noted in *H.A.*, 19: 1817.

1347. DESHUSSES, L., AND CORBAZ, J.

Observations sur la fumure de plantation et les traitements appliqués. (Observations on the manuring and spraying of fruit trees.)

Rev. hort. suisse, 1950, 23: 205-7.

In 1944 an experimental apple orchard consisting of 5 varieties on EM. II was planted in the gardens of the Laboratory of Agricultural Chemistry, Châtelaine. Each tree received at planting a single application of either 74 kg. manure or 53 kg. compost [formula 80 kg. peat, 5 kg. horn shavings, 4 kg. potassium sulphate and 2 kg. "Composto"] in order to determine whether peat compost is a full substitute for farmyard manure, the scarcity of which constitutes a problem in Switzerland as elsewhere. After five years of observation the compost proved at least equal to farmyard manure supplied at an equivalent rate, while the controls showed distinctly poorer growth. The results of one year's trials on scab control are also tabulated.

1348. DANIEL, W. H., AND TURK, L. M.

Methods for determining the needs of peach trees for potash fertilizer.

Quart. Bull. Mich. agric. Exp. Stat., 1949, 32: 199-207, bibl. 4, illus.

A modified form, details of which are given, of the rapid Purdue-test was found to give satisfactory results in determining potash deficiency in experiments on low potash soils in Michigan.

1349. WENTZLER, J. E., AND WHITE, D. G.

The effects of nitrogenous fungicides and insecticides on the chlorophyll content of apple leaves.

Proc. Amer. Soc. hort. Sci., 1949, 54: 81-5, bibl. 4.

Studies are reported on the effects in 1949 of spray applications of NuGreen (urea), Fermate (ferric dimethyldithiocarbamate), Crag 341 (2-hepta-decylglyoxalidine), parathion and phenothiazine on potted 2-year-old McIntosh and Stayman Winesap trees. Chlorophyll content was chosen as the best means of comparing nitrogen contents. Sprays were applied 4 to 10 times before leaves were sampled on various dates but in general showed no significant increases in chlorophyll, and there was no pronounced cumulative effect. Stayman Winesap leaves consistently contained more chlorophyll per unit area than McIntosh leaves, probably because of their greater thickness.—Pennsylvania State College.

1350. LANGER, C. A., AND FISHER, V. J.
Relation of wax emulsion and fungicidal sprays to size, color, and composition of fresh and processed Montmorency cherries.
Proc. Amer. Soc. hort. Sci., 1949, **54**: 163-70, bibl. 3, being *J. No. Mich. agric. Exp. Stat.* 1084.

Montmorency cherries in 3 Michigan orchards were sprayed 0, 1 and 2 times during the growing season in 1948 with a 1% solution of Dowax 222, a wax emulsion. The trees also received incorporated fungicidal sprays of Bordow, a proprietary copper material, or Fermate (ferric dimethyldithiocarbamate). Dowax 222 increased the size of cherries, and lowered the soluble solids and total solids of fresh fruit and the drained weight of canned cherries. Addition of Fermate resulted in larger cherries than addition of Bordow, but, when used in two applications, produced an undesirable residue, and reduced the quality of processed fruit.

1351. SWINGLE, C. F.
How and why we mulch fruit trees in Door County.
Wis. Hort., 1950, **40**: 124-6, illus.

A popular account of mulching practices in Door County, Wisconsin, in apple and cherry orchards, with locally available materials such as straw, sawdust, shavings, cedar bark peelings, marsh hay, apple pomace, cherry pits, manure, cornstalks, paper bags and leaves. One case of using stones for a mulch is known.

1352. AUBERT, P.
Façons culturales du verger. (Orchard cultural practices.)
Arbres et Fruits, 1949, No. 44/45, pp. 20-6, bibl. 5.

The possible application of methods of cover cropping, green-manuring and mulching to orchards in different parts of Switzerland is discussed in the light of Canadian and American experience. A cover crop seeds mixture is suggested for use in French-speaking Switzerland.

Irrigation.

(See also 1222, 1261-1265.)

1353. MOLENAAR, A.
Sprinkling in [Washington State] orchards. Report on 1948 questionnaire returns.
Proc. 63rd Conv. Amer. pomol. Soc., Yakima, Wash., Dec. 1948, 1949, pp. 20-6.
 CLARK, C. C.
Sprinkler equipment problems and improvements.
Ibidem, pp. 26-9.

The consensus of opinion was that the sprinkling saves water and labour and facilitates orchard operations generally. The difficulties arising under particular circumstances are noted. Three makes of sprinkler predominate in Washington and their weak points and the methods of surmounting the difficulties involved are discussed.

1354. VEIHMEYER, F. J., AND HENDRICKSON, A. H.
Essentials of irrigation and cultivation of orchards.
Circ. Calif. agric. Ext. Serv. **50**, revised 1950, pp. 23, illus.

First published in 1930, this circular has since been revised on several occasions in the light of new experience. It is written essentially for the fruit grower, and the terms used and methods advocated are explained in simple language, supported, in the latest edition, by a number of diagrams. The ground covered can be gauged from the main headings, which are: Use of water by trees; tree responses to soil moisture conditions; irrigation during the growing season; seasonal irrigation; the influence of irrigation on root distribution; cultivation of orchards. Though written primarily for California, it should be of interest to growers of irrigated tree crops in many parts of the world.

1355. ANON.
High power sprinkler is used to cover wide area and varied crops on island in Columbia River.
Bett. Fr., 1949, **44**: 4: 7, 18.

A new, large-sized sprinkler is described, with nozzles resembling those of a fire engine, which delivers 0.94 in. of water per hour over an area 312 feet in diameter. This type of irrigation has been successfully applied to various crops growing in a sandy soil on an island in Columbia River. Figures are given for the cost of operation.

1356. KENWORTHY, A. L.
Soil moisture and growth of apple trees.
Proc. Amer. Soc. hort. Sci., 1949, **54**: 29-39, bibl. 23, being *Sci. Pap. Wash. agric. Exp. Stats.* 843.

One-year-old Winesap apple whips planted in soil-compost mixture in pots in a greenhouse were subjected to different watering treatments over 2 years. The treatments allowed the trees to use 20, 40, 60, 80 and 100% of the available soil moisture prior to watering. Correlations of high significance were found to exist between amount of water used, leaf area, chlorophyll content per tree, shoot growth and increases in trunk diameter and dry weights. Drying out to 80% of available soil moisture significantly reduced all measurements including chlorophyll per tree, but not chlorophyll per unit of leaf area. Allowing trees to wilt also significantly reduced the moisture contents of shoots, leaves and the entire tree. Re-applying water after only 20% of the available soil moisture had been used resulted in insignificant decreases in all measurements.

Preharvest treatment.

1357. VYVYAN, M. C.
The use of growth substances to control the shedding of fruit.
Ann. appl. Biol., 1949, **36**: 553-7, bibl. 23.

The subject is reviewed under the following headings: Normal losses of blossoms and fruits; adjustment of the crop to size of tree; use of sprays of α -naphthalene-acetic acid, or its derivatives, to control the pre-harvest drop; to control June drop; possible improvements in the control of fruit drop by the use of other growth substances; methods of application; effect of maturity and behaviour of fruits in store; damage to fruit or tree; investigation of processes underlying fruit drop and its control.

1358. LUCKWILL, L. C.

Fruit drop in the apple in relation to seed development.

Ann. appl. Biol., 1949, 36: 567-8.

The method of preparing extracts, the test method, and results with the varieties Beauty of Bath and Lane's Prince Albert are here outlined. It is concluded that fruit drop in the apple is under the control of a hormone produced in the endosperm of the seed, and that the successive waves of fruit drop are correlated with temporary deficiencies in hormone production resulting from development changes in the endosperm.

1359. STANKOVIČ, D. M.

A study of pre-harvest fruit drop of apple and pear. [Yugoslavian. Summary in French, $\frac{1}{2}$ p.]

Ann. Trav. sci. tech. Agric. Belgrade 3, 1948, No. 5, 11 pp.

Good results were obtained against pre-harvest fruit drop in apples and pears by spraying with 2,4-dichlorophenoxyacetic acid (0.001%), α -naphthaleneacetamide (0.001%), and α -naphthaleneacetic acid (0.0015%).

1360. TUKEY, H. B., AND HAMNER, C. L.

Form and composition of cherry fruits (*Prunus avium* and *P. cerasus*) following fall applications of 2,4-dichlorophenoxyacetic acid and naphthaleneacetic acid.

Proc. Amer. Soc. hort. Sci., 1949, 54: 95-101, bibl. 14, illus., being *J. Pap. Mich. agric. Exp. Stat.* 1090.

Spraying some 500 sweet and sour cherry trees on 17 October with a mixture of 100 p.p.m. NAA and 16 p.p.m. 2,4-D resulted in: 1. Characteristic curvatures of foliage and delayed abscission the same season. 2. Injury to twigs, buds and spurs. 3. Delayed blossoming the following spring. 4. Delayed abscission of calyxes and of abortive flowers and fruits. 5. Elongated fruit with pointed apices. 6. Enlarged receptacle. 7. Strong vascular development within both fruit and pedicel. 8. Strong adherence of pedicel to fruit. 9. Adherence of the flesh to the pit and immaturity of the flesh near the pit. 10. Lighter colour of fruit and delayed maturity. 11. Change in chemical composition of fruit, notably increase in moisture content and titratable acidity and reduction in sugar content. It is not known whether the responses were due to either NAA or 2,4-D alone or to both in combination.—Michigan State College.

1361. SMOCK, R. M., AND GROSS, C. R.

Some effects of limb and fruit injections with ascorbic acid and calcium salts on apple fruits.

Proc. Amer. Soc. hort. Sci., 1949, 54: 61-72, bibl. 5.

Limb injections were made with 4 litres 0.8 to 2.0% ascorbic acid or 0.5% $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$; fruit injections were made through secondary growth from spurs by Levy's method using 13 c.c. 0.3 and 0.5% ascorbic acid or 0.3 and 0.5% calcium lactate ($\text{Ca}(\text{C}_3\text{H}_5\text{O}_3)_2 \cdot 5\text{H}_2\text{O}$). Both forms of ascorbic acid injection resulted in firmer apples if made more than 2 weeks before harvest. Limited data suggest that Ca lactate had a similar effect, but the effect of CaCl_2 was masked by injuries. There was evidence that both ascorbic acid and Ca limb injections reduced soluble

pectin values in the fruit at harvest, that ascorbic acid injections to both fruit and limbs influenced the respiration rate of apples, but that none of the treatments consistently influenced ascorbic acid contents of the fruits.—Cornell Univ.

Harvesting and packing.

1362. HIGGINS, F. H.

Look! No ladders!

Amer. Fruit Gr., 1950, 70: 3: 18, 32-3.

A further account of work with the "Iron Monkey" in a peach orchard [see *H.A.*, 19: 131]. The advantages mentioned include the possibility of picking at night, the reduction of labour cost and harvesting the fruit in a better condition.

1363. MAUCH, A.

Wissenswertes von der Ritscher-Leiter.

(The Ritscher ladder.)

Mitt. ObstVersuchsring Jork, 1949, No. 21, pp. 103-5, illus.

A very handy folding ladder on two wheels, made of steel tubes, was tested at the Jork Research Station.

1364. ANON.

New apple grader from Holland.

Fruitgrower, 1950, 109: 521, illus.

A description of the new, Dutch "Jansen" apple grader, that was recently demonstrated by the East Kent Packers Ltd. at Faversham. It was designed for speed and accuracy, and to cause the minimum of damage to the fruit and the minimum of fatigue to the workers. The output is from 540 to 900 bushels a day and the cost is £545.

1365. ANON.

British-made apple wrapping machine.

Fruitgrower, 1950, 109: 561, illus.

The construction and performance of an apple wrapping machine, capable of dealing with 50 fruits a minute, is described. It was tested commercially last year with very satisfactory results. No bruising occurred and the fruits stored perfectly. Three similar machines are being manufactured this year for demonstration to growers in Kent. If the response is favourable, they will be mass produced in time for this season's crop. The price will be about £350.

1366. LOEWEL, E. L., AND SCHEIL, W.

Richtlinien für die Standardisierung unseres Obstes. (Directions for the standardization of [German] fruit.)

Mitt. ObstVersuchsring, Jork, 1949, No. 22/23, pp. 107-22, illus.

Specifications of 4 grades of apples and directions for packing are given.

1367. VINEY, R.

Paper holder for apple packing.

N.Z. J. Agric., 1950, 80: 69, illus.

A simple efficient paper holder for apple packing, which may be fitted to the usual cradle-type case holder on the fruit grader, is described, with a diagram showing components and paper holder assembled.

1368. WOODWARD, H. C.

Quality of Maine McIntosh apples from orchards to consumers.

Bull. Me agric. Exp. Stat. 478, 1949, pp. 36.

Consideration is given in this preliminary report to the following circumstances which may influence the amount of bruising in apples, viz. methods of picking, packing into ordinary or padded boxes, shape and size, grading, transport methods, method of selling apples retail.

Noted.

1369. a ANON.
The Solo peach. A new variety [for canning purposes] introduced by the Summerland Station.
[Mim. Publ.] Inf. Serv. Dep. Agric. Canada, 16 January, 1950, pp. 2.
- b GRANHALL, I.
Om naturliga vegetativa mutationer hos våra fruktträd. (Natural budsports in fruit trees.)
Årsb. svensk Jordbr. Forskn., 1950, pp. 92-5. A brief survey of the subject.
- c GUZZINI, D.
Rosa mantovana e Rosa del Caldaro. (Rose of Mantua and Caldaro's Rose [the distinguishing features of two very similar apple varieties].)
Ital. agric., 1949, 86: 732-8, illus.
- d KOBEL, F., AND SPRENG, H.
Der Obstbau im Alten Land bei Hamburg. (Fruit growing in the Altenland district near Hamburg.)
Schweiz. Z. Obst- u. Weinb., 1950, 59: 172-6, illus.

- e KOBEL, F.
Einfluss des Versuchswesens auf den Obstbau. (The influence of research on fruit growing [in Switzerland].)
Gärtnermeister, 1949, 52: 393-5, illus.
- f KUEHNER, C. L.
Pruning the old Wealthy tree.
Wis. Hort., 1950, 40: 128, illus. Illustrations with captions.
- g LANTZ, H. L.
New apples in the midwest.
Fruit Var. hort. Dig., 1949, 4: 95-7, illus. Description of six varieties from Minnesota and Iowa.
- h MINISTRY OF AGRICULTURE, LONDON.
Plums and damsons.
Adv. Leaflet. Minist. Agric. Lond. 268, 1949, pp. 4, 1d.
- i ORLOV, F. K.
Spacing fruit trees. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 3-6.
- j V.D. STELT, L.
Omenten. (Top-grafting.)
Fruiteelt, 1950, 40: 115-17, illus.
- k VAN WESTRHENEN, P., Jr.
Ervaringen met omenten. (Top-grafting experiences.)
Fruiteelt, 1950, 40: 113-14.
- l WINTER, T. S.
Bee diseases.
Bull. N.Z. Dep. Agric. 242, revised 1949, pp. 24.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(See also 1203, 1288, 2149, 2172.)

1370. DARROW, G. M.
The changing pattern in small-fruit varieties.
Amer. Fruit Gr., 1950, 70: 5: 11, 37, illus.
Of the 15 most important varieties of strawberries in the United States in 1916, only 4 are still on the list of the 15 most important varieties in 1949. New improved varieties of strawberries, raspberries and blackberries are described.
1371. HIRST, F.
Soft fruit for canning is still in short supply.
Grower, 1950, 33: 774-5.
The best English canning varieties of the following are described briefly: Plums, greengages and damsons, cherries, strawberries, raspberries, gooseberries, blackberries, blackcurrants, apples, and pears.
1372. DARROW, G. M.
Polyploidy in fruit improvement.
Proc. Amer. Soc. hort. Sci., 1949, 54: 523-32, bibl. 24.
A general review in which reference is made to work on strawberries, blackberries, raspberries, blueberries, cranberries, grapes, apples, and stone fruits.

1373. BLAIR, D. S.
Currant culture.
Publ. Inf. Serv. Dep. Agric. Canada 833, 1950, pp. 5, illus., being Circ. 181.
Adapted from Publ. 775 [H.A., 16: 701], this circular gives general advice on varieties of black, red and white currants, their propagation, cultivation, mulching, manuring and pruning.
1374. TURNBULL, J.
Identification of black currant varieties.
J. hort. Sci., 1950, 25: 175-80, illus.
Shoot characters of 21 black currant varieties are described, 12 of them with the aid of photographs. A key is provided giving the apparent derivation of each variety as well as distinguishing characters as seen in late June and early July. Three groups are recognized: A. stems coloured; petioles usually coloured, occasionally green. B. stems greenish; petioles pale. C. stems green; petioles pink or with pink markings.—N.A.A.S.
1375. ŽITNEVA, P. I.
Forming the black currant "mother" bush. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 14-17, illus.
In Russia at present there is no organization for

securing cuttings for the propagation of black currants from selected "mother" bushes. It is suggested that a mother plantation of healthy bushes should be maintained in each black currant growing region. The quality of the cuttings depends on the part of the bush from which they are taken. The most vigorous are those taken from one-year shoots growing from dormant buds below ground level. Recommendations are given for pruning the bushes in order to obtain cuttings to the best advantage.

1376. DARROW, G. M., SCOTT, D. H., AND GILBERT, F. A.

Two new blueberry varieties, Coville and Berkeley.

Bull. N.J. agric. Exp. Stat. **747**, 1949, pp. 4.

DARROW, G. M., AND GILBERT, F. A.

Berkeley and Coville blueberries introduced.

Fruit Var. hort. Dig., 1949, 4: 94-5, illus. (UNITED STATES DEPARTMENT OF AGRICULTURE.)

Two new blueberry varieties introduced.

[Publ.] *U.S. Dep. Agric., agric. Res. Administ.*, 24 October, 1949, p. 1.

The Berkeley blueberry has firm, light blue berries larger than any variety now in the trade; it ripens during mid-season. Coville is later than any commercial variety now grown, and the berries are almost as large as those of Berkeley. Both are of the highbush type, vigorous, productive and relatively easy to propagate. They are recommended for trial as commercial varieties from Maryland to New Jersey. The Berkeley has also shown promise in Michigan.

1377. DOW, G. F., AND OTHERS.

Producing blueberries in Maine.

Bull. Me agric. Exp. Stat. **479**, 1950, pp. 42, illus.

This bulletin supplies the grower with up-to-date information, based on research carried out at the Agricultural Experiment Station, on blueberry production under Maine conditions. Problems of fertilizer practice, propagation, the use of bees to improve pollination, pest and disease control, weed control with chemical herbicides, crop protection from birds and animals, and methods of harvesting and marketing are among the subjects dealt with.

1378. VAARAMA, A.

Alustavia havaintoja Amerikkalaisten pensasmustikkalajikkeiden viljelyominaisuuksista. (Preliminary observations on several highbush blueberry varieties in Finland.) [English summary $\frac{1}{2}$ p.]

Maataloust. Aikakausk., 1950, **22**: 22-30, bibl. 8.

Observations were made in Finland on 10 varieties of young highbush blueberries of American origin. Rancocas, Pemberton, Stanley and June seemed most promising. Under Finnish conditions certain characteristics of the varieties tested deviate considerably from those observed in the United States.

1379. SCHWARTZ, C. D., AND MYHRE, A. S.

Further experiments in fertilizing blueberry hardwood cuttings.

Proc. Amer. Soc. hort. Sci., 1949, **54**:

186-8, bibl. 3.

At Puyallup, Wash., applying N in various forms with or without P and K, to peat-sand propagating beds produced desirable growth increases in Jersey blueberry hardwood cuttings, which were still evident in 2-year-old plants. 40 lb. actual N per acre is suggested as a desirable rate of application. The response was enhanced and earlier rooting promoted by the use of bottom heat as compared with unheated beds. [For earlier report see *H.A.*, 19: 148.]

1380. BAILEY, J. S., SMITH, C. T., AND WEATHERBY, R. T.

The nutritional status of the cultivated blueberry as revealed by leaf analysis.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 205-8, bibl. 3, being *Contr. Mass. agric. Exp. Stat.* **711**.

Analyses of leaves from Rubel blueberries growing in the Cape Cod section of Massachusetts suggest that its requirements for P, K, Ca and Mg are lower than those of other fruit species.

1381. KOVALEVA, T. N.

Cornelian cherry growing in U.S.S.R. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 1, pp. 31-3, illus.

The Cornelian cherry or "kizil" [*Cornus mas*] is cultivated in various parts of the U.S.S.R., particularly in orchards of the Crimea and the Caucasus, where it occurs either isolated or in small groups, pure plantations being rare. The small-fruited wild form is widely distributed in woods, and also in gardens as seedlings or bushes transplanted from the forests. In orchards large-fruited forms are grown. These are rich in sugars, acids, aromatic and pleasant flavours, and have a high vitamin C content. The fruit is much used for culinary and processing purposes. The bushes are markedly resistant to drought, cold, fungous diseases, and pests. Propagation is by seed, layers, and root suckers. The Cornelian cherry can be grown as an ornamental shrub in gardens and parks. There are various forms differing in size, shape and colour of fruit.

1382. ALEKSANDROV, A. D.

The pomegranate. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 39-40.

In Russia the pomegranate [*Punica granatum*] is grown in the southern regions (e.g. Armenia, Dagestan, and northern Caucasus), and in central Asia. The tree is described and an account given of the medicinal and industrial properties of the fruit. It can withstand 17° of frost and the fruit ripens in regions that have hot summers and no frost from April to October. In central Asia it is grown in a prostrate form, with stems covered with soil in the winter, when there may be 25-30° of frost. It is propagated by cuttings prepared in the early spring and rooted in warm frames. It is sometimes grown in tubs.

1383. BAILEY, J. S.

Winter injury to red raspberries as affected by cultivation or mulching.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 197-99, being *Contr. Mass. agric. Exp. Stat.* **710**.

In a trial at Amherst, Mass., mulching caused a

reduction in yield in Chief and Latham raspberries in the first year as compared with clean cultivation, but thereafter gave equal or higher yields. With Milton and Taylor, however, mulching increased winter injury to offset, or more than offset, any possible yield improvement. The variety Washington yielded better under cultivation than under mulch. Differential manuring with nitrate of soda had no apparent effect on yields or winter injury.

1384. HILL, R. G., Jr., AND HAUT, I. C.
Growth and yield responses of the Temple strawberry as influenced by plant spacing, width of row, and renewal systems.
Proc. Amer. Soc. hort. Sci., 1949, **54**: 192-6, bibl. 4, being *Sci. Publ. Md agric. Exp. Stat. (Dep. Hort.) A253*.

Results are given over 2 seasons for strawberries established in 12-, 18- and 24-inch thinned rows, 12-, 18- and 24-inch matted rows and single spaced-row plants maintained at 24×9 inches. Following the first fruiting season 3 renewal systems were adopted, the single plants being maintained without runners, the matted rows forming additional runners, and the thinned rows reverting to matted rows. No significant differences in yield occurred the first year, but in the second the spaced row plants yielded significantly more than the other treatments. Adjusting plant stand by thinning and spacing significantly increased plant size and numbers of fruit per plant, and size of fruits was increased in the spaced plants.

1385. NITSCH, J. P.
Growth and morphogenesis of the strawberry as related to auxin.
Abstr. in Amer. J. Bot., 1949, **36**: 827.

The influence of the achenes upon the growth of the strawberry receptacle has been studied. Total removal of the achenes completely stops further growth of the fleshy part. Partial removal of the achenes results in fruits of abnormal shape, because only the parts of the receptacle adjacent to the remaining achenes continue to grow. Only fertilized achenes are active. The weight of the fleshy part of a strawberry is a linear function of the number of developed achenes. The achenes can be replaced by synthetic growth substances in their action upon the growth of the receptacle. Beta-naphthoxyacetic acid (100 p.p.m.) and beta-indolebutyric acid (0.3%) have induced strawberries of normal shape and size in the absence of achenes. Relatively high amounts of ether extractable "free auxin" have been found in the achenes, in contrast to the receptacles which did not yield any free auxin. On the other hand, "total auxin" yields (obtained by boiling with NaOH) do not seem to bear any relation to the studied physiological phenomena. [Author's abstract.]—California Institute of Technology, Pasadena.

1386. ROBERTS, H. D.
Report of 3 years of observation of sprinkler irrigation for berries.
Wis. Hort., 1950, **40**: 134-5, 167, illus.

A summary of 3 years' observations on the irrigation of strawberries, using rotating sprinklers and portable pipe. The functions these irrigations serve are: frost protection during blossom time, irrigation of

growing plants, application of soluble fertilizers and soaking newly laid mulch.

1387. BORGMAN, H. H., AND DE BLIJ, D.
Bestuiving en vruchtzetting van aardbeien onder glas. (Pollination and fruit-set in strawberries under glass.)
Meded. Dir. Tuinb., 1950, **13**: 132-8, bibl. 5, illus.

For the successful cultivation of strawberries under glass efficient pollination must be assured by good circulation of the air for the transportation of pollen. Fruit-set can be encouraged, and increased yields obtained, by the application of growth substances.

Vines.

1388. COSMO, I.
Indagine sulla viticoltura e l'enologia delle Venezie. (Vinegrowing and wine making in Venezia.)
Agric. Venezia, 1949, **3**: 4/5/6: 135-88.

A comprehensive account of the vines grown in the different provinces of Venezia in N.E. Italy and of the use made of them. Details are given of varieties, pruning and training systems, spacing, method of supporting, whether by wires or on living trees, areas devoted to vines grafted on American stocks, nurseries, and number of wine-making establishments.

1389. KROCHMAL, A.
Growing grapes in New Mexico.
Bull. N. Mex. agric. Exp. Stat. **347**, 1949, pp. 31, bibl. 7, illus.

Both American and European varieties of grapes can be grown in New Mexico, and the hot, dry summers appear to be well suited to the production of sun-dried raisins. Information on their culture in this State, obtained from work in the experimental vineyard of the New Mexico Agricultural Experiment Station, is here briefly presented. The information covers propagation, planting and training methods, cultural practices, pest and disease control, and harvesting. Notes are given on promising varieties grown in the experimental vineyard and on varieties generally grown in other parts of the State. Investigations on the possibility of raisin production in southern New Mexico are only in the preliminary stages, but in 1948 good results were obtained with Thompson Seedless and Black Muscat. The procedure and equipment needed for raisin production on the farm are described.

1390. BIRON, M.
Cinsaut en Thrace. (The Cinsaut vine in Thrace.)
Progr. agric. vitic., 1950, **133**: 172-7.

The Cinsaut grape vine variety is described in relation to its cultivation in Thrace, where it is worked largely on Rupestris du Lot. It is considered to be very suitable for that region as yielding an excellent table grape for Istanbul, and an agreeable red wine. Analyses of its fruit, obtained over several years, are tabulated.

1391. PEYNAUD, E.
Bilans des acides organiques des vins. (Organic acids of wines.)
Industr. agric. aliment., 1947, **64**: 399, from abstr. in *Rev. Agric. Brux.*, 1948, **1**: 563 [received 1950].

A biochemical study of many varieties of grapes at various stages of maturity enabled the author accurately to follow the course of the organic acids during the process of maturity of the chief vines of Bordeaux and Burgundy. The composition of over 100 French wines was also investigated, and the formation and behaviour of acids in the must during fermentation was experimentally determined. The results indicate the inadequacy of oenological regulations that are not solidly based on the physiological phenomena of maturation.

1392. DE FREITAS, A. G. B.

Influência da superfície foliar da videira no crescimento da uva e na composição do mosto. (The effect of leaf surface of the vine on the development of the berries and on the composition of the must.) [French summary $\frac{3}{4}$ p.]

Agron. lusit., 1947, 9: 141-52 [received 1950].

In a study using the varieties João de Santarém and Diagalves it was found that the volume of the berries and their sugar content (%) was directly proportional to the leaf area per berry. The total acid on the contrary varied inversely as the leaf area.

1393. GOLLMICK, F., AND SCHILDER, F. A.

Histologie und Morphologie der Rebenblätter in ihren Beziehungen zum Reblausbefall. (The histology and morphology of vine leaves and their relationship to phylloxera incidence.)

Reprint *Mitt. biol. Reichsanst. Land- u. Forstw.*, Berlin-Dahlem, 65, 1941, pp. 4-6 [received 1950].

The histological and morphological characteristics of vine leaves do not bear any relationship to phylloxera resistance and may therefore be disregarded by the breeder.

1394. CONTARDI, H. G., AND PIMENIDES, A. C.

Experiencias comparativas con los métodos gravimétrico y volumétrico en el proceso transpiratorio de la vid (*Vitis vinifera* L.). (A comparison of gravimetric and volumetric methods for determining the transpiration rate of the vine.) [English summary, $\frac{1}{2}$ p.] *Rev. Fac. Cien. agrar.*, 1949, 1: 23-8, bibl. 7, illus.

Using the gravimetric method of estimation, it was found that each sq. cm. of leaf surface of the variety "Pedro Giménez" transpires approximately 1 c.c. of water in 24 hours. There was a positive correlation between the results obtained by the two methods, the gravimetric method recording a transpiration rate 25% higher than the volumetric method.—*Nat. Univ. Cuyo, Argentina*.

1395. COSMO, I.

Gli I.P.D. in Italia. (The present position of direct producer vines in Italy.) *Humus*, 1950, 6: 2: 21-3.

Although the proportion of vineyards devoted to the cultivation of direct producer hybrid vines in Italy is very much lower than in France, considerable attention has been devoted to their raising and testing in northern

Italy, especially at the Conegliano Viticultural Research Station. In this note the author gives a short account of the salient characters of Baco 1 (0 24-23), Seibel 1077, Couderc 7120 and Seibel 880 and discusses certain others. Further, he suggests that those who cultivate such hybrids should grow, not one, but two or three, so that the very diverse defects of one may become masked in winemaking by the defects or even assets of the others.

1396. BESSA RIBEIRO, M.

Possíveis porta-enxertos para a região de Colares. (Possible [vine] rootstocks for the district of Colares.)

Rev. agron., Lisboa, 1945, 33: 321-8 [received 1950].

Owing to the dry, sandy soil of the vine growing district of Colares in Portugal, and to phylloxera infestation, the yield of grapes is low and the cost of production high. The local method of propagation consists in planting vine cuttings directly into the clay subsoil. The possibility of using phylloxera-resistant rootstocks is discussed. Six American stocks, *Berlandieri* and *Rupestris* species and hybrids, selected for their deep rooting, resistance to drought and tolerance of lime, are being tested with local varieties at the Field Station of the Porto Vitivinícola de Dois Portos, Colares. Special attention is being given to their effect on the quality of the wine.

1397. BESSA RIBEIRO, M.

O "Corriola" ou "Alves do Bairro" como porta-enxerto. ("Corriola" or "Alves do Bairro" as a rootstock.)

Rev. agron., Lisboa, 1945, 33: 329-36, illus. [received 1950].

The characteristic tartness of the Minho wines depends largely on the fact that the vines are grown as climbers, thus providing shade and a high relative humidity for the bunches. The need for a phylloxera-resistant rootstock, that is adapted to the soil and climate of the district, compatible with local varieties, and sufficiently vigorous to allow rampant vegetative growth of the scion, is urgently needed if the local industry is to survive. Preliminary observations indicate that the rootstock "Corriola" satisfies these requirements, but further studies of its performance are needed before it can be distributed extensively. It is suggested that "Corriola" might be useful in the breeding of new rootstocks for local use.

1398. HARMON, F. N.

Comparative value of thirteen rootstocks for ten vinifera grape varieties in the Napa Valley in California.

Proc. Amer. Soc. hort. Sci., 1949, 54: 157-62, bibl. 4.

Data on the fruit weights, pruning wood weights, and growth ratings, taken during the 12th and 13th years from budding, indicate a wide range in value of the various rootstocks tested for this locality. The five highest ranking rootstocks are *Rupestris* St. George, Dog Ridge, Constantia, Mourvedre \times *Rupestris* No. 1202, and Monticola \times *Rupestris*. Of these five, *Rupestris* St. George, the rootstock most widely used commercially in this district, was equal to the best of

the other rootstocks or was slightly superior in most of the tests. [From author's summary.]

1399. SNYDER, E.

Longevity in California of American grape varieties grafted on various rootstocks.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 177-80, bibl. 9.

A table is given showing 191 stock-scion combinations, involving 48 varieties and 40 rootstocks, which are growing well in California in their 37th year. This indicates that such grafted vines have a satisfactory longevity and that stock-scion incompatibility has not been a major factor.

1400. MARKIN, M. I.

Raising young grapevine plants from softwood cuttings. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 26-30, illus.

Details are given of the preparation of grapevine softwood cuttings [*H.A.*, 19: 2838] and of the treatment of the young plants in the nursery. The care necessary for preventing flagging on transplanting is emphasized.

1401. ORLOVA, T. G.

A new method of planting vines. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 30-1.

A new method of planting "kiljčevanie" [*H.A.*, 20: 636] vine cuttings is described. A hole is made in the soil to a depth customary in that particular region and a handful or two of manure thrown in. The cutting is placed in the hole with its upper cut end just below the level of the soil and leaning against the south side of the hole, with its uppermost bud turned towards the soil. A mixture of soil and manure is added until after watering there will be a layer of 10-15 cm. deep and water is applied up to the edge of the hole. This should leave the cutting fairly firm in the hole. It is then left and not earthed up. Advantages are claimed for this modification of the ordinary method in which the cuttings are planted upright and earthed up.

1402. RICKLI, E.

Das Rebspalier. (Vine training [in Switzerland].)

Gärtnermeister, 1949, **52**: 321-4, illus.

A well illustrated article, with a list of vine varieties suitable for Swiss conditions. Planting, training and pruning, and disease control are described.

1403. LIGER, P.

Note sur un nouveau mode de conduite de la vigne. (A new method of training vines.)

Fruits et Prim., 1950, **20**: 10-11, illus.

The method, which is described, was developed at Bône, Algeria, and consists in training vines on the Guyot system on stems about 4 feet tall, the shoots above this being supported by 3 wires, which are threaded through angle-iron supports fixed at angles of 45° on top of eucalyptus posts. It is claimed that the method facilitates mechanical tillage and reduces disease by keeping the plants away from the ground.

It is only satisfactory, however, on fertile soils and where sufficient water is available.

1404. LOOMIS, N. H., MURPHY, M. M., AND COWART, F. F.

The effect of different methods of spur pruning upon the production and growth of Muscadine grapes.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 183-5.

In trials over 5 years in Georgia and Mississippi no significant effect on yield resulted either from varying spur length or from removing 50% of the spurs in pruning Hunt muscadine grapes, nor in varying the number of buds per spur from one to four in Thomas muscadine grapes. With the latter, vigour at the end of the fifth year, as measured by weight of prunings, was greatest in vines that had been pruned the hardest.

1405. LOOMIS, N. H.

The effect of pinching off the terminals on yield and cane growth of Champanel grapes.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 181-2, bibl. 4.

In an experiment conducted over a five-year period at the United States Horticultural Field Station, Meridian, Mississippi, pinching off the terminal growth of spur-pruned Champanel grape vines at or just after blossoming time significantly increased the yield of fruit and decreased the weight of prunings. The treatment is recommended only for varieties that are excessively vigorous in relation to the amount of fruit produced. [Author's summary.]

1406. TURJANSKII, G. F.

Potential fruit producing buds of vine. [Russian.]

Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 4, pp. 23-7.

An account of the recovery of vines from the effect of hard winters, as in 1939-40, when the temperatures fell to -31° C., showing how hibernating buds on shoots developing from dormant buds on woody parts of the vine may come into normal fruiting the following year.

1407. PLAKIDA, E. K.

The yield of grapes from previous year's side shoots. [Russian.]

Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 4, pp. 22-3.

Figures are given for three varieties showing the amount of fruit from the main stem and from the side shoots of vines, the side shoots being cut back to 3 or 4 buds. It is concluded that the practice of removing the side shoots completely in spring is not justified.

1408. MAUME, L., AND ANDRÉ, A.

Observation, par le diagnostic foliaire, de la nutrition de vignobles en Beaujolais. (Applying nutrients, in relation to foliar diagnosis, to vineyards in the Beaujolais district.)

C.R. Acad. Agric. Fr., 1950, **36**: 68-72.

Further notes on applying N, P, and K fertilizers to vines according to requirements indicated by analyses of the foliage [see also *H.A.*, 19: 959].

1409. FLEMING, H. K., AND ALDERFER, R. B.
The effects of urea and oil-wax emulsion
sprays on the performance of the Concord
grapevine under cultivation and in Ladino
clover sod.

Proc. Amer. Soc. hort. Sci., 1949, **54**:
171-6, bibl. 12.

No increase in vigour or yield occurred when Concord grapes were sprayed in 3 successive years at midsummer with NuGreen, a proprietary form of urea, at 6 to 7 lb. per 100 gal. Half the vines were clean cultivated and half were growing in clover sod, but all received good care and substantial soil fertilizer applications, and it is suggested that the lack of response may have been due to the nitrogen supply being adequate already. Two oil-wax emulsion sprays of 1% Dowax 222 applied in 2 seasons had no effect on berry size and yield in the clover sod block, but significantly improved size in the clean cultivated block, though to the detriment of colour and texture.—Pennsylvania State College.

Nuts.

1410. MORETTINI, A.
Biologia florale del castagno. (Floral bio-
logy in the chestnut.)
Ital. agric., 1949, **86**: 721-31, bibl. 24, illus.

Detailed consideration of the findings of other workers and of his own observations in Italy leads the author to a summary of the chief points of general interest which are as follows: (1) *Castanea sativa* consists of a population, the floral characters of which vary greatly. Most of the trees are monoecious, but some of these are physiologically dioecious by reason of the non-production of pollen by the male flowers. (2) Where large plantations of these physiologically dioecious plants occur pollinators must be interplanted. (3) Fruit forms in the normal way by fertilization of the female gamete which may be autogamous or heterogamous. (4) Certain monoecious individuals are self-fertile which makes autogamy possible, others are self-sterile in varying proportions, and in them heterogamy is the rule. In the dioecious individuals fertilization is either heterogamic or is effected by pollen of other monoecious specimens. (5) Chestnuts are anemophilous. The great variability in characteristics of the chestnut makes it all the more important to find disease-resistant individuals.

1411. COVINGTON, H. M.
Pecans, planting and culture.
Ext. Circ. N.C. agric. Ext. Serv. **342**, 1949,
pp. 7.

Brief notes for the N. Carolina grower on choice of variety, planting, liming, fertilizing, use of cover crops, soil management, pruning and rosette disease (zinc deficiency).

1412. ARTSCHWAGER, E.
The time factor in the differentiation of
secondary xylem and phloem in pecan.
Amer. J. Bot., 1950, **37**: 15-24, bibl. 10,
illus.

The studies presented in this paper were undertaken to gain further information on the seasonal cycle of growth of pecan varieties in the Mesilla Valley, New Mexico, the time at which secondary xylem and

phloem tissues differentiate, and the existence of a possible correlation between winter hardiness and the carry-over of undifferentiated cambium derivatives. No varietal differences in structure could be found which would explain variation in winter hardiness.—U.S.D.A. Field Station, State College, New Mexico.

1413. ROBY, F.
Nuevas variedades de nogal de brotación
tardía. (New varieties of late flowering
walnuts.) [English summary 4 lines.]
Rev. Fac. Cien. agrar., 1949, **1**: 1: 1-5, illus.

Seven varieties of walnut, that come into leaf and flower 15-45 days later than the varieties commonly grown in the province of Mendoza, Argentina, are described. Six of them are not sufficiently productive to be grown commercially but would be valuable for breeding. The seventh, known as "Roby 7", has excellent commercial qualities, and is recommended for growing in those districts where late spring frosts make walnut growing hazardous.

1414. ŠČEPOTJEV, F. L., AND BORISENKO, T. T.
The photosynthesis of walnut (*Juglans
regia* L.) in relation to the different geo-
graphical origins of its seed. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1949, **67**:
933-6.

Two samples of walnut seeds from the Caucasian shores of the Black Sea and a third from Ukraine were sown in the open in an agro-forestry nursery in the Kharkov province, and the photosynthesis experiments described were carried out on the one-year-old seedlings. The relative photosynthetic energy of the leaves was determined at various hours of the day during 14 days in August and the results expressed graphically. It was found that the plants of the seed from the southern (Caucasian) region showed assimilation that was greater, and ceased relatively earlier, than the Ukrainian plants. The products of the photosynthetic activity of the leaves of the Caucasian forms were expended in growth and not in the production of reserve substances necessary for the transition to winter rest. The Ukrainian plants on the other hand were able to store reserves which enabled them to withstand the winter.

1415. KALMYKOV, S. S.
How to increase the yield of walnuts.
[Russian.]
Sad i Ogorod (Orchard and garden), 1950,
No. 1, pp. 26-9.

The Bostandyk region of the Kazah (Kazakh) S.S.R., has a semi-subtropical climate, and walnut, almond, and pistachio grow wild on the mountain slopes and are grown in the villages, the walnut being particularly widely distributed. The walnut yields are, however, very low, and the author examines the cause. Data show how they vary with the relative discrepancy or coincidence of the flowering of the male and female flowers, from 0-70 kg. per tree where they do not coincide at all, to 13-56 kg. where coincidence continues for 5 days or more. Another factor affecting yield is the weather during flowering and the development of the fruits. Dry winds with low rainfall and high temperatures are unfavourable. Recommendations for increasing productivity are (1) hanging

catkins of male flowers on trees where the male flowers are not yet mature or have shed their pollen, (2) budding trees with scion wood from others that produce male flowers which shed pollen when the female flowers of the grafted tree are ready for pollination, and (3) irrigation during the flowering period.

1416. ZARUBIN, A. F.
Secondary flowering in the Persian walnut.
[Russian.]

Priroda (Nature), 1949, No. 10, pp. 65-7,
bibl. 2, illus.

Secondary flowering in *Juglans regia* is unusual, but it occurred on many trees in southern Kirgiz during 1946-1947, when it was associated with an almost total destruction of young branches by late spring frosts. It was more pronounced on trees somewhat isolated than on those in the forests. In a normal season (with no spring frosts) secondary flowering may occasionally occur towards the end of June, but in frost years it is delayed until the beginning of July, for the previous year's growth is killed and flowering is on the new shoots. In the forest the secondary flowering produces long (up to 50 cm.) spike-like inflorescences which bear ♂ and ♀ flowers and arise not only from terminal buds but also from lateral resting buds. Dichogamy is more marked on the secondary than on the primary inflorescences.

1417. ZARUBIN, A. F.
On the possibility of parthenogenesis in the Persian and black walnuts. [Russian.]
Priroda (Nature), 1949, No. 10, pp. 64-5.

From field observations on Persian walnut trees (*Juglans regia*), with flowers isolated in parchment bags or borne on proterogynous trees without being enclosed. Such flowers developed fruits while those of proterandrous trees remained sterile, and it is suggested that the ♀ flowers of proterogynous trees are self-fertile and parthenogenetic. This may occur in *J. nigra* also, but the observations were inconclusive, because of the possibility of fertilization from pollen which settled on branches and leaves and remained viable long enough to get blown on to the ♀ flowers.

1418. MAURER, K. J.
Möglichkeiten der vegetativen Vermehrung der Walnuss. (Vegetative propagation of walnuts.)
Schweiz. Z. Obst- u. Weinb., 1950, 59: 136-7.

In spring 1949, shoots of 300 different types of walnut were layered and stool beds were also prepared. Rooting capacity was found to be a varietal characteristic, but root formation could be induced only where the shoot had been wired previously. Ringing and breaking failed to give a response. Although layering was fairly satisfactory, better results were obtained by earthing up and wiring the shoots in the stool beds. So far the types Nos. 252, 542, 286, 386 and 175 have proved the best rooters. Further work, which will include the use of hormones, is in progress.—Fruit Research Station, Geisenheim on Rhine, Germany.

1419.
a BAILEY, J. S.
Blueberry varieties for Massachusetts.
Fruit Var. hort. Dig., 1949, 4: 91-3, illus.
b BITTNER, C. S.
Grape culture in Pennsylvania.
Circ. Pa agric. Ext. Serv. 353, 1950, pp. 10, illus.
Advice to growers.
c LOTT, W. L.
Land preparation and fertilization for strawberries [in North Carolina].
Ext. Circ. N.C. agric. Ext. Serv. 336(F), 1949, pp. 3, illus.
d MORROW, E. B., AND COVINGTON, H. M.
Strawberry varieties for North Carolina.
Ext. Circ. N.C. agric. Ext. Serv. 336(A), 1949, pp. 6.
e MORROW, E. B.
Cultural and training systems for strawberries [in North Carolina].
Ext. Circ. N.C. agric. Ext. Serv. 336(B), 1949, pp. 7, illus.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(See also 1202, 1203, 2122, 2125, 2135, 2172, 2175.)

1420. LORD BLEDISLOE.
The 2nd International Congress of Crop Protection.
Chem. Industr., 1949, 52: 899-904.

The author in his presidential address in London gave estimated losses attributed to pests and diseases in certain horticultural, plantation and other crops, grown in Great Britain, Australia, New Zealand and South Africa.

1421. GRAINGER, J.
The tithe of plant disease.
Repr. Trans. roy. Highl. agric. Soc. Scot., 1949, pp. 21, bibl. 13, illus.

A popular account of the diseases of agricultural plants in the West of Scotland, describing serious diseases, diseases which cause moderate loss, diseases of little

economic significance, crops with little disease, plant disease and the weather, and virus diseases of potatoes. Three maps show (a) the distribution of nutritional disorders of the oat, summer 1948, (b) the average percentage relative humidity in the British Isles, (c) the average number of rain days per annum in the British Isles, 1938-1944.

1422. MOORE, W. C.
The significance of plant diseases in Great Britain.
Ann. appl. Biol., 1949, 36: 295-306, bibl. 13.

In this presidential address to the Association of Applied Biologists the "intention is to discuss the chief methods by which more or less accurate knowledge of diseases is being slowly acquired in Britain, and to give a few examples of results already obtained, in the hope that further interest may be aroused in the accurate assessment of damage by plant diseases".

1423. SOENEN, A., AND WYBOU, A.

La biologie des parasites en fonction de l'avertissement. (*The biology of parasites as a function of the warning service.*)

Fruit belge, 1950, 18: 34-40.

The part that a knowledge of the biology of the particular organisms plays in relation to the establishment of a diseases and pests warning service in Belgium is discussed for apple scab, codling moth and red spider.

Nutritional disturbances.

(See also 1253-1259, 1605, 1606, 1637-1640, 1712, 1732, 1744, 1786, 1850, 1919-1921, 1972, 2138.)

1424. STEENBERG, F., AND BOKEN, E.

Copper contents and copper deficiency in Danish soil types.

Plant and Soil, 1950, 2: 195-221, bibl. 12.

The results of pot experiments and field experiments with different copper minerals (copper pyrites, bornite, copper glance, cuprite, malachite) and copper chemicals (copper sulphate, cupric oxide, and metallic copper) show that several of these slightly soluble copper compounds are suitable as copper fertilizers if ground to a suitable fineness, and that their residual effect, like that of copper sulphate, is considerable. [From authors' summary.]

1425. MULDER, D.

Magnesium deficiency in fruit trees on sandy soils and clay soils in Holland.

Plant and Soil, 1950, 2: 145-57, bibl. 10.

Leaf samples from 4 Dutch apple orchards showing magnesium deficiency symptoms were analysed by the titan yellow method using both ash and extracts. For comparison leaf samples were also collected from normal and potash-deficient orchards during the period August to October. The following conclusions, among others, are drawn from the tabulated data: "(1) The magnesium contents of leaves from healthy trees are 4-6 times higher than those from diseased trees (according to ash analyses). (2) The potash contents of leaves from diseased trees are 25-50% higher than those from healthy trees (according to extract analyses). (3) Agreement between ash analyses and extract analyses is not always very clear. (4) Basal leaves of healthy trees have only little more extractable magnesium than basal leaves of diseased trees, but in the former case the quantity of magnesium in the ash is much higher." The findings further suggest that the magnesium content of the basal leaves normally decreases early in the summer, while that of the top leaves remains high. Spraying with a 2% Epsom salts solution effected a considerable improvement in the condition of the trees.

1426. CHILDERS, N. F., AND OTHERS.

Manganese deficiency [in peach trees].

Amer. Fruit Gr., 1950, 70: 5: 16, 40-1, illus.

Chlorosis of peach trees in orchards in New Jersey pointed to manganese deficiency. Four weeks after an experimental spray with manganese sulphate (3 lb. to 100 gallons water + 2 lb. Ca caseinate spreader) the leaves regained their green colouring. Susceptibility to frost injury and unfruitfulness observed in

these orchards may be due to manganese deficiency, though there are indications that zinc deficiency may also be involved.

1427. BOWMAN, F. T., AND DAVISON, J. R.

Preharvest drop of d'Agen prunes on the Murrumbidgee irrigation areas.

Agric. Gaz. N.S.W., 1950, 61: 23-5, 40, 93-8, bibl. 2, illus.

The experiments described indicate that the extent of preharvest "drop" of d'Agen prunes is definitely related to the maintenance of a state of vigour in the trees by pruning, soil management (including irrigation and fertilizer practice) and plant disease control. Leaf rust, die-back and poor cultural practice reduce the health of the trees and increase drop.

1428. AARON, I., AND CLARKE, W. S., JR.

Breakage of apple trees.

Proc. Amer. Soc. hort. Sci., 1949, 54: 57-60.

Breakage of limbs carrying a heavy crop was correlated with the presence of abnormal xylem tissue consisting of masses of cells in a parenchymatous condition where wood fibres, or in some cases vessels and tracheids, would ordinarily have occurred. The greatest amount of both breakage and abnormal xylem was found in Stayman Winesap, less in Baldwin and least in York Imperial.—Pennsylvania State College.

1429. VAN STUIVENBERG, J. H. M., AND POWWER, A.

Wordt stip in appels veroorzaakt door een verstoring van het groeistof-evenwicht? (Is bitter pit in apples caused by a disturbance in the growth-substance balance?)

Fruittel., 1950, 40: 150-1, illus.

It is claimed that the incidence of bitter pit in apples was reduced by spraying the trees at the end of June or in the first half of July with indolylacetic acid at 10 p.p.m.

Climatic factors.

(See also 1383, 2163.)

1430. REBOUR, H.

Une nouvelle explication du "retour de sève". (A new explanation of delayed foliation.)

Fruits et Prim., 1950, 20: 83-4, illus.

The author comments on the work of G. D. B. de Villiers in South Africa [*H.A.*, 19: 1112] in which it was shown that delayed foliation due to high winter temperatures could be prevented by dormant oil sprays. The sprays reduced water losses from the trees by as much as 50%. It is pointed out that observations on the forcing of fruit under glass and on fruit grown under the dry North African winter conditions confirm the need for adequate atmospheric humidity as well as low enough temperatures, if normal foliation is to occur in the spring.

1431. WEINBERGER, J. H.

Prolonged dormancy, a southern problem of peaches.

Amer. Fruit Gr., 1950, 70: 3: 17, 30-1, illus.

Insufficient chilling—699 hours by 15 February—caused prolonged dormancy in peaches at Fort Valley, Ga., in 1949. All varieties, except those requiring

only 750 hours of chilling, suffered seriously, but even with the latter blossoming was considerably delayed. A low concentration of dinitro-*o*-cyclohexylphenol incorporated in a dormant spray of lubricating oil emulsion and applied a few weeks before the normal date of blossoming was found greatly to stimulate blossoming and leafing out. However, exact timing which is necessary to ensure success is difficult and the effect on yield is doubtful. Hence, breeding of peach varieties with low chilling requirements will continue until the problem of dormancy breaking has been solved by chemical means.

1432. HARRIS, W. B.
Bud burst delay of stone fruits.
J. Dep. Agric. S. Aust., 1950, 53: 356-8, bibl. 1.

Trials are described in which peaches and apricots were sprayed with a potassium salt of α -naphthaleneacetic acid to delay bud burst and so avoid frost injury. A delay of 10 days in the flowering of Elberta peaches was obtained at 800 p.p.m. on 9 March. No delay nor increase in fruit set was obtained by a spray of 200 p.p.m. at bud swell. There were significant increases in percentage of fruit set as a result of treatment. Fruit wood of Moorpark apricots was damaged by treatments which were effective in peaches. No delay was observed in those Moorpark buds which came into flower. The use of α -naphthaleneacetic acid for reducing frost risk is, at present prices, too costly to be practicable.

1433. COOLEY, J. S., AND GROVES, A. B.
Root and collar winter injury of apple trees.
Phytopathology, 1950, 40: 355-62, bibl. 13, illus.

These injuries to the collar and root system of apple trees are considered to be due not to the primary action of a pathogen, but to complex effects of low temperatures, and other environmental circumstances which have increased susceptibility to cold. The term "physiochemic injury" is suggested to denote this condition.—Plant Industry Station, Beltsville, Maryland.

1434. VASILJEV, I. M.
Winter and spring "burn" of fruit trees and its control. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 1, pp. 15-17.

In certain coastal regions of southern Russia, in central Asia and in Siberia, fruit trees are often severely damaged by "sunburn" in winter and spring, as the result of the alternation of intense insolation on the south-facing sides of the trees during the day, and the very low temperatures during the night. This happens particularly in early spring when the heat during the day stimulates the rise of sap, thus making the bark more susceptible to the effect of frost at night. The damage varies from slight injury to the peripheral bark cells to the death of the whole bark exposed to such extremes of heat and cold. The wounds become partly covered by callus during the summer, but they become larger in the following winter because the tissues there are particularly susceptible being incompletely protected. Such wounds are subject to insect attack and fungal infection. The treatment

recommended is to limewash the stems and branches in autumn after leaf-fall, repeating the application in winter if the covering is partly removed by rain or frost. The treatment is particularly desirable in the early spring.

1435. LOEWEL, E. L.
Über Frostschäden in der Blüte unserer Obstbäume. (Frost damage to fruit tree blossom.)
Mitt. ObstbVersuchsring, Jork, 1950, No. 7/8, pp. 40-3, illus.

The varying susceptibility to frost of different fruit trees in Altenland and Mecklenburg and possible control measures are discussed. A list of apple varieties is given, grouped according to frost resistance.

1436. BAILEY, J. S.
Frost injury to blueberries.
Fruit Var. hort. Dig., 1949, 4: 98.

Bud injuries by frost on individual blueberry varieties at the Massachusetts Agricultural Experiment Station are expressed in percentages.

1437. LUCE, W. A.
Proper water use hardens trees.
Bett. Fr., 1949, 44: 3: 16.

In early maturing districts, which are often without snow for the greater part of the winter, frost penetrates the soil deeply and the trees are liable to root and trunk injury. Irrigation, just before the ground freezes, may avert damage.

1438. GERBER, H.
Neuzeitliche Frostbekämpfung. (A modern method of frost protection.)
Schweiz. Z. Obst- u. Weinb., 1950, 59: 181-5.

The article summarizes the discussions of a meeting at Wädenswil, to which Professor Laine, Finland, had been invited to lecture on his new method of fog generation for frost protection (*H.A.*, 19: 205 and 20: 1440). In the plains of Finland the area covered by one generator is now stated to be 10-20 hectares, but on slopes or in hilly country—as Swiss trials have shown—one generator is required per hectare. In these experiments it was also found that the fog must be developed before the temperature sinks below +0.5° C. The generator, which is now produced in Switzerland, is illustrated and the cost of the operation is worked out. According to Professor Laine smoke is necessarily ineffective as a protective cover, as the small size of its particles permits the heat rays to escape through the "wide-meshed net", while the larger droplets constituting the fog reflect the rays.

1439. WINKLER, H.
Frostskyddsundersökningar. (Frost protection studies [in Sweden].)
Årsb. svensk Jordbr. Forskn., 1950, pp. 122-3.

A frost research station, Flahults Försöksgård, has been established in the hills of Jönköpings county, southern Sweden, 223 m. above sea level and at a latitude of nearly 58°, where an average of 21.3 days of frost occur during the period May-September. Potato is the most frost-susceptible crop grown in this area. Experiments were carried out with artificial fog

consisting of SO_2 dissolved in an equal amount of chlorosulphonic acid to which a little sulphuric acid was added. The generator used is briefly described. The fog gave complete protection to potatoes during several frost nights between 15 and 20 August, while unprotected fields were severely damaged. Similar results were obtained in another area on mid-summer night. The actual temperatures are not given.

1440. KOBEL, F.
Frostschutz nach dem System von Prof. Tauno Laine. (Professor Laine's frost protection system.)
Schweiz. Z. Obst- u. Weinb., 1950, 59: 155-6.

A preliminary trial of Professor Laine's method of fog generation [water vapour + SO_2 ; see *H.A.*, 19: 205] for frost protection gave encouraging results in Switzerland. The technique seems very promising, as the equipment is cheap and a large area is covered by the fog produced from one generator. The author recommends the trial of the method on a large scale.

1441. COURSHÉE, R. J.
Report on the protection of orchards from frost.
[*Publ.*] *Nat. Inst. agric. Engng*, 1949, pp. 36+tables and graphs, bibl. 19, illus., 5s. 3d.

A survey is given of the ways in which frost damages fruit crops, and of the methods which have been used to prevent such damage. Some of these methods, i.e. the use of Harrington oil heaters, radiation heaters, irrigation, smudging, and the utilization of the soil as a heat reservoir, are discussed in more detail in 5 appendixes. It is considered that air circulators, particularly large low-powered fans, promise to be an effective and economical method of protection. Investigations were carried out at Wrest Park [the new home of the N.I.A.E.], Silsoe, Beds., and in a private orchard at Melbourne on the operation and performance of horizontal fans of the type used in experiments by the C.S.I.R., Australia [see *H.A.*, 17: 2078 and 18: 2549]. The results indicated that (a) under suitable conditions a frost fan will raise the air temperature by 3-8° F. in an acre of orchard at an almost negligible operational cost; (b) it is most efficient under conditions obtaining when a radiation frost is most probable; (c) it would have relatively little effect in a wind-borne frost; (d) it would have little effect in a weak inversion and it would be necessary to add heat artificially; and (e) the action of the fan appears to cause the bodily replacement of cold air by warm air rather than the mixing of cold and warm air by turbulent motion. The capabilities of the fans are not yet such that they can be considered for commercial work. Ways of improving their performance and the construction of more economic units are discussed. Further research is needed to correlate temperature gains with increase in crop yield, and to improve temperature measuring techniques.

1442. HOARE, E. R.
Frost and fruit trees.
Fmg Norwich, 1950, 4: 141-4, illus.

Methods of combating frost damage are discussed with special reference to investigations in progress by the

National Institute of Agricultural Engineering at Wrest Park. Particular attention is being paid to types of fans designed to draw down relatively warm air from the inversion layer, and to methods of measuring temperatures accurately at different altitudes. Another possible line of investigation is the use of water from sources that are above freezing point.

1443. BACKHAUSEN, J.
Beheizung frostgefährdeter Weinberganlagen. (Frost protection of vineyards by heating.)
Tech. Baern Gärt., 1949, No. 17, pp. 411.

An improved orchard heater, fed on furnace-coke, giving frost protection through heat radiation for vines within a 15-20 m. radius is described. O.J.

1444. SKLJAR, N. I.
A half-covering method in viticulture.
[Russian.]
Vinodelie e Vinogradarstvo (Wine-making and viticulture), 1950, No. 3, pp. 24-5.

In the north Caucasian coastal (Black Sea) regions the problem of protecting vines in winter by covering them with soil is complicated because during hard winters there are periods of warm moist weather, when vines covered with soil suffer from bud rot, and this reduces yield. A method of half covering the vines is advocated. A layer of 4-5 cm. would probably be effective, but the difficulty is that in these regions there are strong north-east winds which, in snowless dry winters, remove some of the covering soil. A layer of 8-10 cm. is therefore recommended.

1445. MAKAROV-KOZUHOV, L. H.
Obtaining yields from frost damaged vines.
[Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 28-32, illus.

Fruiting can be quickly restored in vines that have been so severely damaged (e.g. by frost) that all the fruit-bearing wood is killed, by pinching back the primary shoots which arise from the base of the damaged stems, and then the secondary shoots which spring from the primary shoots, or by a "combination" method in which the shoots arising after the second pinching are removed so that the buds at their base grow out. The results of such treatment, sometimes being fruiting the same year, are recorded and illustrated, and varieties that respond satisfactorily are mentioned.

1446. BOGDANOVA, V. S.
Early uncovering of vines as a means of reducing bud rot. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 33-5.

In the Kazakh (Kazakh) S.S.R. the growth period of vines is short because of frost in late spring and early autumn. The time of uncovering the vines in spring, however, must not be delayed too long or serious bud rot will result. This sometimes causes far greater loss of buds than direct injury from frost. Data tabulated show that in the Alma Ata province, in 1948 and 1949, there was less bud rot when the vines were uncovered towards the end of March and beginning of April than when it was delayed until the middle or end of April.

1447. KONDO, I. N.
Regeneration of fruit-bearing branches on grapevines damaged by frost. [Russian.] *Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 5, pp. 18-21.
- The development on vines of fruit-bearing branches from "replacement" buds in relation to the damage of buds by frost is described. Tables are given showing the "regeneration coefficients" of a number of varieties.
1448. GEVORKJAN, A. M.
Quick restoration to fruitfulness of grape vines in the Ararat valley. [Russian.] *Vinodelie i Vinogradarstvo* (Wine-making and viticulture), 1950, No. 5, pp. 21-2.
- Frost damaged vines in the Ararat valley of Armenia, where spring, autumn, and winter frosts, and hail, often cause much harm, were induced to fruit on the lateral shoots by pinching back the vigorous shoots that first arose from the damaged vines.
1449. PEYER, E.
Neuerung in der Versicherung der Reben gegen Hagelschäden. (The insurance of vines against hail damage.) *Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 153-5.
- Vine growers are recommended to extend their hail insurance to cover the loss in yield in the year following the hail damage sustained.
1450. BÖMEKE, H.
Blühende Apfelbäume im Herbst 1949. (Apple blossom produced in autumn 1949.) *Mitt. ObstbVersuchsring Jork*, 1949, No. 21, pp. 102-3.
- Two-three weeks after a heavy hail storm in Altenland near Hamburg, damaged apple trees started new growth and blossom appeared in mid-September. It lasted till November; some fruit set and leaf bud was also observed. Trees which lost their leaves prematurely through heavy scab showed partial blossoming and are expected to do so again in spring. This experience suggests the possibility of changing biennial into regular bearing.
1451. BOUBALS, D., AND HUGLIN, P.
Un dépérissement de la vigne en relation avec la sécheresse. (The withering of vines in relation to drought.) *Progr. agric. vitic.*, 1950, 133: 137-44, bibl. 1, illus.
- In the summer of 1949 vines suffered severely from drought in the rootstock trial beds at the Montpellier agricultural college, and observations were made on the relative degree of damage shown by various hybrid rootstock varieties under trial. The drought symptoms started with a yellowing of the leaf margin; the degrees of yellowing are figured and used as a notation in assessing the damage.
1452. HOEKSEMA, K. J., AND KOPPIEN, P.
Droogteschade in het Kromme Rijngebied. (Drought injury in the Kromme Rhine district.) *Fruiteelt*, 1950, 40: 88-91, illus.
- Severe drought injury to fruit trees in the Utrecht river-clay district in the dry years 1947 and 1949 is described and the causes discussed in relation to grass orchards and the water-table. It is concluded that steps should be taken to raise the level of the water-table.
1453. TKATCHENKO, B.
Défense contre la sécheresse et contre l'érosion dans les steppes de la Russie méridionale. (Protection against drought and erosion in the south Russian steppes.) *Agron. trop.*, 1950, 5: 3-41, bibl. 54, illus.
- Periodic droughts in the steppe regions of Russia have led to crop failures on a vast scale and to the loss of much valuable soil through erosion. The author reviews the work that has been done to mitigate these disastrous effects since early in the nineteenth century, at first on a small local scale and more recently on a wide regional basis. Particular emphasis is placed on the establishment of shelter belts of trees, which not only reduce the force of drying winds, but, it is claimed, improve the water holding capacity and fertility of the soil in adjoining fields. Trees used in shelter belts and methods of planting, including the use of mechanical planters, are described, as are steps taken to arrest the movement of sand, cultural measures and irrigation.
1454. TIMOFEEVA-SAHAROVA, H.
The white acacia and the common gleditschia. [Russian.] *Kolhoz. Proizv.* (Collective farming), 1949, No. 9, pp. 21-2.
- The white acacia and the common gleditschia grown in Russia in shelter belts serve also to fix the sand in ravines and on steep slopes. Their form, flowers and fruit are described.
1455. ALJBENSKIĬ, A.
Shrubs for shelter belts. [Russian.] *Kolhoz. Proizv.* (Collective farming), 1949, No. 10, pp. 21-2, illus.
- It is recommended that shelter belts in Russia should include shrubs many of which are mentioned as suitable, particularly for the steppe regions where they shade and loosen the soil. They include certain fruit trees and bushes such as apricot, cherry plum, cherry, golden, black and red currants, hazel, Cornelian cherry, and service berry, and a number of hedgerow bushes.
- Virus diseases.*
1456. DEMAREE, J. B.
The virus problem in berry crops. *Amer. Fruit Gr.*, 1950, 70: 3: 14-15, 36-40, illus.
- This review of the virus diseases of small fruits in the United States shows that strawberry yellows is a serious threat to the industry. The attention paid to healthy planting material has checked the spread of most raspberry viruses, though mild streak of black raspberries is still on the increase. Mild streak and sterility in blackberries and blueberry stunt are regarded as potential dangers.
1457. ANON.
New outlook on viruses? *Fruitgrower*, 1950, 109: 608-9.
- A rather confused report of a talk given on 1 April,

1950, by Dr. S. Marian, in which the speaker expounds his theory that virus diseases are caused by an electrical unbalance in plant or animal cells, resulting in an accumulation of protein around positively charged atoms. He claims that sporonine, a constituent of pollen, could be made to provide high concentrations of negatively charged oxygen which, if introduced into the plant or animal, would counteract the conditions giving rise to the development of virus diseases.

1458. MILBRATH, J. A.

Cherry virus ills threaten orchards.

Bett. Fr., 1950, 44: 10: 6, 22-5.

Little cherry constitutes a serious threat to cherry and peach orchards in the Pacific Northwest. The three types of the disease occurring in this area are discussed, but no recommendations can as yet be made on how to check the spread of the virus.

1459. BROOKS, R. M., AND HEWITT, W. B.

Occurrence of certain diseases in sweet cherry seedlings propagated on Stockton Morello rootstocks.

Proc. Amer. Soc. hort. Sci., 1949, 54: 149-53, bibl. 10.

A block of 726 sweet cherry trees, mostly seedlings, representing 54 crosses, propagated on Stockton Morello rootstock were examined for various diseases; 162 trees showed varying degrees of the cherry blister disease; 25 trees showed fasciation or witches broom; 23 of the trees showed cherry crinkle leaf; 2 trees showed symptoms similar to pinto leaf mosaic; and 2 a condition called big node. It appears that the cherry blister disease resulted from transmission to the scion from the rootstock, and that the fasciations and crinkle leaf both developed as a result of hybridization. No attempt is made to explain the presence of the pinto leaf mosaic and big node. [Authors' summary.]—University of California.

1460. WINKLER, A. J. (Editor).

Pierce's disease investigations.

Hilgardia, 1949, 19: 207-64, bibl. 16.

The history of Pierce's disease of vines in California and research on the virus and its vectors are reviewed in detail. Two serious outbreaks have been recorded, one between 1880 and 1900 and the other starting in 1935 and now declining. There was a close correlation between the outbreaks and above average rainfall. Symptoms of the disease are described; all commercial grape varieties are susceptible, but there appears to be some variation in tolerance. The virus, which also causes alfalfa dwarf, includes 73 species of plants, notably grasses and clovers, in its host range, and 18 insect vectors have been found, of which the more important have been described [see *H.A.*, 20: 135, 136, 137 and abstracts 1461 below]. *Control experiments*: Little benefit has resulted from roguing, which indicates that diseased vines are not a major source of the virus, but the removal of diseased vines and replanting with healthy plants at least once a year has maintained production. Weed control by cultivation or oil sprays and various pruning treatments have had no effect, and there is no evidence that control of leafhopper vectors by insecticides would result in appreciable control.

1461. DELONG, D. M., AND SEVERIN, H. H. P.
Spittle-insect vectors of Pierce's disease virus. I. Characters, distribution, and food plants.

SEVERIN, H. H. P.

II. Life history and virus transmission.

Hilgardia, 1950, 19: 339-56, bibl. 5, illus., and 357-82, bibl. 27, illus.

The four species of froghopper described and illustrated in colour are *Aphrophora angulata* Ball, *A. permutata* Uhler, *Clastoptera brunnea* Ball and six varieties of *Philaenus leucophthalmus* (Linnaeus). All have been found able to transmit the virus from diseased to healthy grapevines, but as none has been found occurring naturally on vines they would appear to be of little economic importance in spreading the virus. *P. leucophthalmus* may, however, infect perennial herbs and thus establish reservoirs of infection.

Bacteria.

1462. MALTSCHIEWSKY, N.

Über die Anpassungsfähigkeit von *Azotobakter chroococcum*. III. Mitteilung: Azotobakter als Ursache des Obstverderbs. (The adaptability of *A. chroococcum*. III. Azotobacter as the cause of fruit rot.) *Z. Pflernähr. Düng.*, 1949, 47: 249-56, illus.

The brown tissue of rotted pears was found to contain masses of micro-organisms, which were partly rod-shaped and partly resembled cocci. Isolation and culture on various media showed that the organisms were different shapes of *Azotobacter chroococcum* and inoculation experiments proved that the bacterium was the cause of the pear rot. In view of the great adaptability of *Azotobacter* to various nutritional conditions it seems possible that the organism is of greater importance in agriculture than has hitherto been suspected. Eleven microphotographs illustrate different shapes of the organism.

1463. MANIL, P.

Tumeurs végétales. (Plant tumours.)

Bull. Inst. agron. Gembloux, 1948-49, 17: 26-42, bibl. 44.

The author classifies plant tumours according to their origin, thus: (a) parasitic tumours, (b) tumours resulting from hybridization and (c) tumours resulting from physical, chemical or hormonal stimulation. He discusses at some length a few of the more important examples of each type.

1464. LUCE, W. A.

Pear blight observations in 1948.

Proc. 63rd Conv. Amer. pomol. Soc., Yakima, Wash., Dec. 1948, 1949, pp. 35-8.

TUFTS, W. P., AND DETAR, J. E.

The present status of pear blight in California.

Ibidem, pp. 38-42.

VOLMER, W. E.

Control of pear blight in my Hood River orchard.

Ibidem, pp. 42-4.

These three articles on fire blight in pears (*Bacillus amylovorus*) indicate that but little change has occurred recently in control measures recommended, that

copper-lime dusting may have advantages over bordeaux spraying, but that trial is necessary to determine this. The present programme recommended for Californian orchards is set out.

Fungi.

1465. ŠAŠIN, A. I.

Timing the spraying for scab. [Russian.]
Sad i Ogorod (Orchard and garden), 1950,
No. 3, pp. 21-3.

Timing the spraying for apple scab from an examination of the asci of the perithecia on overwintered leaves is described. It was found that in the Krasnodar region the greatest intensity of spore dispersion is when 70% or more of the perithecia are ripe.

1466. FORGEUR, G.

Étude sur cinq produits à base de soufre, dans la lutte contre la travelure. (A comparison of five sulphur preparations for the control of scab.)

Fruit belge, 1950, 18: 65-9.

Trials on pear trees were made with lime-sulphur, barium polysulphide, colloidal sulphur, bentonite wettable sulphur, and bentonite sulphur as a dust. It was concluded that (1) colloidal sulphur and wettable sulphur with bentonite are superior to the polysulphides of calcium and barium, (2) the causticity of the colloidal and bentonite sulphurs has no effect on the variety Durondeau, (3) scorch due to polysulphides appears 8 to 10 days after application, and (4) the bentonite sulphur dusts are as effective as the sprays.

1467. JAIVENOIS, A.

Les traitements pré-floraux. (Pre-blossom spraying.)

Fruit belge, 1950, 18: 53-4.

The fungicides recommended for pre-blossom application in orchards are (a) for varieties of apple and pear very susceptible to scab: neutral bordeaux mixture containing 1.5% copper sulphate; (b) for apples and pears little susceptible to scab but infested with red spider: "traitement brun" (mixture of lime-sulphur and copper oxychloride); (c) for special varieties of apple very sensitive to spray damage: a little before blossoming lime-sulphur only; (d) for orchards of small commercial value and not very susceptible to scab: copper oxychloride 1.5% together with a late winter treatment.

1468. VUITTENEZ, A.

Nouveaux essais de traitements complémentaires de la tavelure du poirier. Traitements d'hiver. (New trials of complementary treatments against pear scab. Winter treatments.)

C.R. Acad. Agric. Fr., 1950, 36: 155-8.

Spraying the ground in winter with certain preparations, such as 2% sodium dinitrophenate, or 12% sulphate of ammonia, destroys most of the spores of *Venturia pirina* developing on the fallen leaves in contaminated pear orchards.

1469. MOORE, M. H.

Scab and codling sprays reduce brown rot loss.

Grower, 1950, 33: 368-71.

Rot spreads less in wrapped fruit.

Grower, 1950, 33: 417-19.

Over three seasons 12-year-old Cox's Orange Pippin apple trees on M. IX were subjected to four spray treatments, involving complete treatment with lime-sulphur, nicotine and arsenate, and treatments in which one of the sprays was omitted. The omission of either codling moth or scab sprays, by increasing avoidable injury, resulted in 12% and 10% additional rotting respectively through invasion by the brown rot fungus, *Monilia fructigena*, while omission of the sawfly spray had no effect on rotting. Experimental work done elsewhere is briefly discussed, as are such factors as orchard sanitation, bird damage, russetting and cracking. With plums and cherries the fruit is more subject to unavoidable injury than are apples and in addition they are subject to attack by *M. cinerea*. Cobnuts and filberts are also liable to infection following punctures by the nut weevil. The article concludes with a brief account of storage rots. [A full report of the experiment described above will appear in *J. hort. Sci.*]

1470. MOORE, M. H.

This brown rot problem.

Fruitgrower, 1950, 109: 317-19.

The results of recent investigations on infection by, and control of, the brown rot fungi (*Monilia* spp.), some of which have not yet been published elsewhere, are presented to the grower. As protective spraying of apples with the standard summer fungicides has not given effective control, experiments were made on Cox's Orange Pippin at East Malling during 1945 and 1946 to test the effectiveness of some newer fungicides. Infection was not reduced by either 1 or 2 summer applications of sprays containing phenyl mercury chloride, tetramethylthiuram disulphide, or the dimethyldithiocarbamate of iron or zinc. In later experiments, however, made at Reading by R. J. W. Byrde [see *H.A.*, 19: 2894], 1 application of phenyl mercury chloride did reduce infection in 2 isolated rows of plums, and summer protective sprays have also shown promise elsewhere. It is therefore thought that success depends largely on local conditions, and is most likely to be achieved where trees are grown in relative isolation or if the number of spores in a plantation can be reduced on a commercial scale. Other experiments were made at East Malling during 1946-48 to find out what proportion of wounds on the fruit (i.e. points of entry for the fungus) can be avoided. It was found that on apples unavoidable wounds, due mainly to cracking, mechanical damage and damage by birds and wasps, resulted in infection amounting to about 10% of the total crop present in July. The prevention of other wounds is discussed.

1471. CROWDY, S. H.

Observations on apple canker. III. The anatomy of the stem canker.

Ann. appl. Biol., 1949, 36: 483-95, bibl. 20, illus.

The development of cankers caused by *Nectria galligena* on apple trees is described. The fungus attacks all tissues outside the xylem and will also penetrate the xylem, invading the parenchyma, vessels and fibres. In the xylem the spread of the pathogen is checked by tyloses and gumming in the vessels, and by gumming in the parenchymatous tissues. The development of the canker depends on the balance between the

development of the pathogen and the resistance of the host.—Long Ashton Research Station, Bristol.

1472. KIENHOLZ, J. R.

The evolution of mildew sprays at Hood River.

Proc. 63rd Conv. Amer. pomol. Soc., Yakima, Wash., Dec. 1948, 1949, pp. 29-31.

FISCHER, G. W.

What we know and what we need to find out about apple mildew.

Ibidem, pp. 31-5.

The only spray tested at Hood River likely to replace lime-sulphur against apple mildew is dinitro acryl phenyl crotonate (arathane or Cr 1639). This is also promising for mitre control.

1473. JUGANOVA, O. N.

An effective method for controlling vine mildew. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 35-7.

Spraying with a preparation of copper naphthenate in the early spring before the buds burst proved to be a very effective method of controlling vine mildew [*Uncinula necator*].

1474. VERDEREVSKIĬ, D. D.

The effect of spraying the lower surface of leaves in controlling mildew. [Russian.]

Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 4, p. 28.

An experiment is described in which leaves of vines were sprayed on the upper, lower, and both surfaces, in tests for the control of downy mildew [*Plasmopara viticola*] with bordeaux mixture and copper naphthenate. Application to both surfaces was far more effective than to one only, and to the lower only better than to the upper only.

1475. WENZL, H.

Die Bekämpfung des amerikanischen Stachelbeermehltaus (*Sphaerotheca mors-uvae*).

(Control of American gooseberry mildew.) [English summary $\frac{1}{2}$ p.]

PflSch. Ber. Wien, 1950, 4: 47-56, bibl. 16.

The value of existing practice in Northern Europe is confirmed for Central European conditions. Good results were obtained with an alkaline spray containing 0.75% each of copper sulphate and sodium carbonate in water, followed by one of 0.5% sodium carbonate, the addition of spreaders increasing the effect. 0.5-0.75% formalin gave satisfactory results but both 2% soft soap and 0.1% KMnO_4 were found insufficient. Winter applications of lime-sulphur, dinitro-*o*-cresol and a mineral oil-tar oil mixture were also effective.

1476. GOEHEEN, A. C.

Botrytis twig-blight of blueberries in Washington.

Abstr. in *Northwest Science*, 1950, 24: 1: 30.

A disease of the cultivated blueberry, *Vaccinium australe*, causing twig blight, fruit rot and leaf spot, is present in the coastal area of western Washington. It was found to be caused by a species of *Botrytis*. Inoculation experiments showed that *V. australe* and *V. pennsylvanicum* are apparently more susceptible

to the fungus than *V. occidentale*, *V. ovatum*, *V. parvifolium*, *V. uliginosum* and *V. virgatum*, while *V. canadense*, *V. scoparium* and *V. ovalifolium* are apparently less susceptible.

1477. CADMAN, C. H.

Control of raspberry cane spot in Scotland.

Scot. Agric., 1950, 29: 220-6, bibl. 2.

As a result of three major trials and several smaller experiments [data submitted], carried out in the Strathmore area, Scotland, the author concludes that the following schedule can be relied on to give efficient control of raspberry cane spot: (1) 5% lime-sulphur at bud burst, at 150 gal./acre, and (2) 2% lime-sulphur at green bud, at 300 gal./acre. If only one spray can be applied, the first is probably the more important.—Scottish Raspberry Investigation (East Malling Research Station), University College, Dundee.

1478. SCOTT, D. H., AND OTHERS.

Occurrence of strains of the strawberry red stele fungus, *Phytophthora fragariae* Hickman, as shown by differential varietal response.

Phytopathology, 1950, 40: 194-8, bibl. 10.

In the variety infection trials described 5 types of soil were used, i.e. A: potting soil steamed; B: steamed potting soil inoculated with red-stele infected plants from Oregon; C: red-stele-infested bench soil which came originally from a Maryland test plot; D: soil from an area in the same test plot from which C was taken; E: soil from a Maryland strawberry field where the Temple variety had not been infected, but where Howard 17 had been killed by red stele. The varieties responded almost exactly similarly in soils C and D: here plants with resistance derived from the variety Aberdeen (Fairland, Pathfinder, Sparkle, and Temple) were susceptible, while those with resistance from the Scottish parents (Md.683 and Md.1972) were highly resistant. In soil E there was complete reversal of varietal response to red stele in comparison with soils C and D. Thus breeding for resistance to red stele in strawberries appears more involved than was originally believed, since at present no variety is known to be resistant to both of the strains now recognized.—Maryland agric. Exp. Stat.

1479. W. F. CHEAL.

Second report on investigations on South Hampshire strawberry problems.

[*Publ.*] N.A.A.S., S:E. Province, Reading, 1949, pp. 24, bibl. 14, illus.

In the red core resistance trials carried out in the 1947-48 season at the Horticultural Experiment Station, Botley, a sudden, widespread wilting, the cause of which was unknown, was observed on all varieties after the first fruiting season [see *H.A.*, 19: 2818]. The summer of 1948 was exceptionally wet. Observations on this "sudden wilt" were continued the following year and are reported here. In the 1949 season, which was exceptionally hot and dry, incidence of "sudden wilt" was on a much smaller scale and occurred later in the season (late September as compared with July). As before, no case was observed among maiden plants. A mycological examination of the roots of plants affected in the previous season revealed the frequent association of

Hainesia sp. with affected material, but no definite evidence was obtained that any parasitic organism is primarily responsible for the wilting. Indeed, the absence of any varietal resistance, the uniform distribution of the disease, and the violence of its progress make this unlikely. It is thought more probable that the trouble is related to soil conditions. The soil of the strawberry plots at Botley is lacking in humus, poorly drained and subject to flooding and surface erosion. Soil improvement experiments are being carried out.

1480. FISCHER, G. W., AND JOHNSON, F.
Cane and leaf rust, *Kuehneola uredinis*
(Link) Arth., of blackberries in Western
Washington.
Phytopathology, 1950, 40: 199-203, bibl. 6,
illus.

The distribution and host range of rust on the cultivated cutleaf Evergreen blackberry, *Rubus laciniatus* Willd. are described, and observations on its life history are recorded. The comparative reactions of varieties of cultivated blackberries, dewberries, and hybrids to cane and leaf rust are tabulated.—Western Washington Exp. Stat.

1481. JOHNSTON, S.
A preliminary report on the control of mummy
berry (*Sclerotinia vaccinii*) in blueberries by
the use of a chemical weed killer.
Proc. Amer. Soc. hort. Sci., 1949, 54:
189-91, bibl. 4.

There are indications from a trial at South Haven, Michigan, that Dow General Weed Killer (dinitro-ortho-secondary-butylphenol) $\frac{1}{2}$ gal. + No. 1 fuel oil 30 gal. + 100 gal. water applied as a ground spray in the spring reduced infection by destroying apothecia of the fungus, as well as aiding in weed control.

1482. JOHANSEN, G.
The Danish species of the discomycet genus
Pezizula.
Repr. Dan. bot. Arkiv, 1949, 13: 3: 26,
bibl. 17, illus.

Two of the 8 species of fungi described have horticultural significance. *Pezizula crataegi* has been found in various parts of Denmark on the bark of apple and pear, and *P. pruinosa* var. *pruni* occurred on the bark of the cherry plum, *Prunus cerasifera*.

1483. DIVISION OF PLANT DISEASE CONTROL,
BUREAU OF ENTOMOLOGY AND PLANT
QUARANTINE.
Control of white pine blister rust.

Leaf. U.S. Dep. Agric. 265, 1950, pp. 8.
An account of "a co-operative effort to prevent damage to the white-pine resources of the United States". The disease is of horticultural interest because it is caused by a fungus, *Cronartium ribicola*, which lives also on wild and cultivated currant and gooseberry bushes.

1484. HUTTON, K. E.
Rust of stone fruit trees.
Agric. Gaz. N.S.W., 1950, 61: 135-8, illus.

In New South Wales *Puccinia pruni-spinosae* is commonly observed on peach, nectarine, plum and prune trees. It affects leaves and fruit and causes cankers on the young branches. Control measures include

the removal and burning of all diseased wood, burying (by ploughing) or collecting and burning diseased leaves, and spraying with bordeaux mixture, lime-sulphur, wettable, or colloidal sulphur. Spray recommendations are given for different species under different conditions.

Nematodes.

(See also 1566i, w, 1616, 1723, 1771-1773, 1819, 1847, 1930.)

1485. SERR, E. F., AND DAY, L. H.
Lesion nematode injury to walnut trees.
Paradox hybrid and Chinese wingnut root-
stocks resistant.
Diamond Walnut News, 1949, 31: 6-8, from
abstr. in *Helminth. Abstr.*, 1950, 18: 84.

The meadow nematode, *Pratylenchus pratensis*, is frequently found damaging the roots of various fruit and nut trees in several counties of California. Among hosts cited are apple, almond, peach, pear, plum, sweet cherry, quince, olive, fig and walnut. Preliminary tests have shown that Paradox walnut hybrids and wingnuts (*Pterocarya*) have either a high degree of resistance, or are markedly tolerant to root lesion nematodes in the situations where they were tested.

Mite and insect pests.

(See also 1393.)

1486. MARSHALL, G. E.
Interrelation of peach insects and disease
control at Orleans, Indiana.
J. econ. Ent., 1949, 42: 806-10.

A spray schedule is suggested based on trials on the Gage Elberta peach variety.

1487. COOMBE, B. G.
Insect pests and diseases of grape vines in
South Australia.
J. Dep. Agric. S. Aust., 1950, 53: 279-93,
illus.

The article opens with a key for the identification, from the types of damage, of diseases and pests of the grape vine. These are then treated in detail with symptoms more fully described and recommendations for control.

1488. HALLIDAY, H. E.
Strawberry insects.
Wis. Hort., 1950, 40: 132-3.

The banded and the ordinary strawberry leaf-rollers [*Ancylys* sp.] caused serious damage in Wisconsin in summer 1949. As a control measure, at the first sign of folded leaves, the field should be dusted or sprayed with arsenate of lead 2 lb. to 50 gallons of water, or 3 lb. 50% wettable DDT to 100 gallons of water, or a 5% DDT dust. If the attack is very serious repeated treatments with rotenone should be given. The white [cockchafer] grub can be killed in the young state by 20 lb. of technical chlordan per acre applied by 15 May and worked into the ground, or by 5 lb. arsenate of lead mixed with 1 bushel of sand per 1,000 infested sq. feet. The damage the arsenic may cause to the strawberry roots will probably be far offset by the protection from grubs. If spittle bug [*Philaenus spumarius* ?] appears before the fruit sets a 5% chlordan dust will control it, with, if necessary, a 0.75% rotenone

dust to follow after the fruit has set. Chlordan should also be applied on edges of grass or weeds round strawberry fields.

1489. STRONG, R. G., AND COX, J. A.

Control of pecan pests.

Ext. Publ. La St. Univ. Div. agric. Ext.
1038, 1950, pp. 4.

A spray schedule, with notes, gives the latest information on pecan pests, what sprays to use against them, and when to spray. The necessity for precautions when using parathion is emphasized.

1490. BROADBENT, L.

The grouping and overwintering of *Myzus persicae* Sulz. on *Prunus* species.

Ann. appl. Biol., 1949, 36: 334-40, bibl. 4.

The aphid *Myzus persicae* overwintered successfully on an almond-peach hybrid for three consecutive years.—Rothamsted Experimental Station, Harpenden, Herts.

1491. SHAW, H., STEER, W., AND DAVIES, R. G.

Laboratory studies on the toxicity of hydrocarbon oils and similar substances to the eggs of some common orchard pests. III. Experiments on the eggs of the green apple aphid (*Aphis pomi* Deg.).

J. hort. Sci., 1950, 25: 190-212, bibl. 14.

A survey of the ovicidal properties of a selection of tar and petroleum oils of varied physical and chemical characteristics was conducted, using the eggs of *Aphis pomi* Deg. as a test organism. Evidence is presented to show that toxicity is determined mainly by the aromatic constituents of the oils, naphthenic and paraffinic fractions being of low toxicity. Toxicity cannot be correlated with any single property of the various oils although distillation range and solubility in dimethyl sulphate jointly afford some guide to biological performance. This latter correlation, however, is far from complete, since aromatic fractions from different oil types, all distilling above 250° C., differ considerably in their toxicity. Tar phenols and bases separated from a low temperature tar distillate are more toxic than is the remaining neutral oil, but there is some evidence of antagonism between the neutral oil and the phenols and/or bases. The susceptibility of the eggs to a horizontal retort high-temperature tar distillate increases late in the season. [Authors' summary.]—East Malling Res. Stat.

1492. LLOYD, N. C.

The cherry aphid (*Myzus cerasi* Fab.) in the Orange district.

Agric. Gaz. N.S.W., 1950, 61: 83-6, 149-52, bibl. 5, illus.

The cherry aphid is a serious pest of cherry trees in the Orange district, the principal cherry growing area of New South Wales. Its life-history, the damage caused, and its control by predators and insecticides are described. Trials showed that DDT will give satisfactory control when the trees are in leaf, provided that an efficient spreader is incorporated.

1493. PICCO, D.

Esperienze di lotta contro gli afidi espletate durante l'anno 1949. (Experiment on the control of aphids in 1949.)

Not. Mal. Piante, 1950, No. 8, pp. 9-12.

The results are described and the data tabulated for summer trials with several proprietary preparations against the green apple aphid (*Aphis pomi*), bean aphid (*Aphis rumicis*), and the mealy aphid of plum and peach (*Hyalopterus arundinis*). Good results were obtained with the preparation "Toxfid".

1494. COX, J. A.

Control of plum curculio on prunes.

J. econ. Ent., 1949, 42: 632-5, bibl. 7.

The plum curculio, *Conotrachelus nenuphar*, is one of the most troublesome pests of prunes in Erie county, Pennsylvania, and sprays of lead arsenate have not given entirely satisfactory control. Tests on commercial orchards of Fellenberg prune, carried out by the Pennsylvania Agricultural Experiment Station, indicated that 3 applications of benzene hexachloride, used at the rate of 0.18 lb. gamma isomer per 100 gal. will give satisfactory control. No off-flavour could be detected in the treated fruit. Three sprays of parathion, at 0.25 lb. per 100 gal., also gave excellent control. No injury to fruit or foliage was observed with either of these chemicals. Two applications of chlordan severely injured the foliage and retarded the development of the fruit.

1495. BACHMANN, F.

Zum Auftreten des Himbeer-Prachtkäfers, *Agrilus chrysoderes* var. *rubicola* Ab. (The incidence of *A. chrysoderes* var. *rubicola* on raspberries [in Switzerland].)

Schweiz. Z. Obst- u. Weinb., 1950, 59: 189-90, illus.

In several cases *Agrilus chrysoderes* var. *rubicola* was identified as the cause of the death of raspberry canes. This is the first record of the pest in Switzerland. Canes attacked by the beetle form longish galls above the point of oviposition and die back. Affected canes, which are easily recognizable, should be cut out before the beginning of June and burnt.

1496. MASON, A. C., AND CHISHOLM, R. D.

An ethylene dibromide-chlordan mixture to control soil-inhabiting stages of the Japanese beetle.

J. econ. Ent., 1949, 42: 639-41, bibl. 4.

Since dipping in the 3-ml. dilution of the ethylene dibromide-chlordan concentrate disinfested plant balls at temperatures above 60° F. of all stages of the Japanese beetle, the use of this procedure under specified conditions has been approved (1948) as a Japanese beetle quarantine treatment. Balled or potted plants can now be shipped to points outside the restricted area at any time of the year. The treatments previously authorized had to be applied when larvae only were in the soil. [Authors' discussion.]—Bur. Ent. Pl. Quar. U.S.D.A.

1497. SHREAD, J. C.

Control of the Japanese beetle.

Circ. Conn. agric. Exp. Stat. 166, 1948, pp. 8.

Some 250 to 300 plants are known to be attacked by the Japanese beetle [*Popillia japonica*], including herbaceous plants, shrubs and trees. When the beetles are abundant the plants may be completely defoliated and the flowers or fruit destroyed. Its life cycle is outlined and shown diagrammatically. The adult population may be controlled by either DDT or

chlordan used as a 50% wettable powder. Its natural enemies include a number of insect parasites, most of which have been imported from the native habitats of the beetle in Japan and Korea.

1498. RITCHER, P. O.

New materials for control of strawberry crown borer.

J. econ. Ent., 1949, 42: 838-9, bibl. 1.

Five per cent chlordan dust and 20% toxaphene dust applied in early spring gave good results during field tests at Kentucky.

1499. VAN LEEUWEN, E. R.

The use of DDT for the control of chestnut weevils.

J. econ. Ent., 1949, 42: 825-8, bibl. 1.

It was found that kaolin type 41 mixed with equal parts by weight of DDT and conditioned in a micro-pulverizer provided a satisfactory spray against *Curculio auriger* (Casey) and *C. proboscideus* F. In tests conducted over a period of 4 seasons, three applications of this mixture at the rate of 4 lb. to 100 gallons of water showed a high degree of control.

1500. FISCHER, —.

Engerlingsbekämpfung in der Baumschule. (Control of cockchafer larvae in the nursery.)

Dtsch. Baumsch., 1950, 2: 18-20.

For chemical control hexa preparations and E605 are applied to the soil as dust or spray or are injected.

1501. MEYER-HERMANN, K.

Engerlingsbekämpfung mit Hexamitteln in der Baumschule. (Control of cockchafer with hexa-preparations in the nursery.)

Dtsch. Baumsch., 1950, 2: 26-9.

The application of various hexa preparations is discussed and the control achieved, especially with a very strong smelling type, is noted.

1502. ANTHON, E. W.

Field experiments for control of shot-hole borer [*Scolytus rugulosus*].

J. econ. Ent., 1949, 42: 854.

DDT and parathion alone or combined may be used for the control of the shot-hole borer on stone fruits if applied at the peak of adult activity.

1503. COX, J. A.

Control of cherry fruit flies.

J. econ. Ent., 1949, 42: 702-3.

Results of experiments made at the Pennsylvania Agricultural Experiment Station indicate that parathion is as effective as the standard lead arsenate treatment for control of the cherry fruit fly (*Rhagoletis* spp.). The parathion residue does not appear to be a serious problem. Chlordan greatly reduced the infestation, but control was not satisfactory.

1504. PUSSARD, R.

A propos de la mouche noire des figes *Lonchaea aristella* Beck. (The fig black fly, *Lonchaea aristella* Beck.).

C.R. Acad. Agric. Fr., 1950, 36: 144-5.

An account is given of attacks of *Lonchaea aristella* in France, and of the damage caused. The fruits most injured are those at the ends of the branches which seems to indicate that the fly is thermophilic. The

varieties of fig which suffer most are: Grosse Bourgeoisotte Noire or Parisienne, Bellone, and Cotigname or Grise. As a bait for use in fly-traps a mixture of equal parts of a 0.3% water solution of ammonium phosphate and a watery extract of fig branches is recommended.

1505. TASCHENBERG, E. F., AND HARTZELL, F. Z.

Grape leafhopper control—1944 to 1947.

Bull. N.Y. St. agric. Exp. Stat. 738, 1949, pp. 40, bibl. 20, illus.

The seasonal history of the grape leafhopper, *Erythro-neura comes* Say is reviewed and the relation of the surroundings to vineyard infestation is stressed. Trials for its control are described. One application of nicotine sulphate, 1 pint to 100 gal., gave excellent control of nymphs for 21 days and at $\frac{1}{2}$ pint kept the population low for 14 days. Other nicotine materials when used at comparable nicotine concentrations gave similar control. A thiocyanate, Lethane A70, at 7.2 oz. per 100 gal. gave good control of nymphs. DDT was very effective against the nymphs and adults at concentrations as low as 4.8 oz. per 100 gal. when applied in July.

1506. LIVŠIĆ, I. Z.

Controlling the olive leaf-hopper. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 2, p. 78, illus.

The damage caused by the olive leaf-hopper, *Euphyllura olivina* O. Costa, is described. Laboratory and field trials have shown that the mature insect is very sensitive to DDT, and dusting with 5% DDT as the buds begin to swell is recommended.

1507. HAMILTON, A.

Why the blackberries fail to ripen.

Publ. N.Z. Ent. Div. 62, 1948, pp. 2, illus., repr. from *N.Z. Sci. Rev.*, 1948, 6: 33-4.

The blackberry mite, *Aceria essigi*, the cause of red-berry disease, has been found on blackberries in Nelson. Its life history and habits are described. So far there are no definite records in New Zealand of loganberries being injured, but in case of attack a lime-sulphur spray should be applied.

1508. DEAN, E. P., AND NEWCOMER, E. J.

Comparative efficiency of materials for controlling orchard mites.

Proc. 63rd Conv. Amer. pomol. Soc., Yakima, Wash., Dec. 1948, 1949, pp. 106-9.

Of 5 materials tested parathion proved the most effective for controlling the Pacific mite, the European red mite and woolly aphid.

1509. GINSBURG, J. M.

Acaricidal properties of hexachlorophenol.

J. econ. Ent., 1949, 42: 839-40, bibl. 4.

Preliminary tests with hexachlorophenol were conducted on European red mite, *Paratetranychus pilosus*, infesting apple foliage. The results indicate high toxicity both in the laboratory and in small-scale field tests. [Author's summary.]—New Jersey agric. Exp. Stat., Rutgers University, New Brunswick.

1510. YOTHERS, M. A., AND CARLSON, F. W.

Scraping and banding apple trees as a supplementary codling moth control measure in the Pacific Northwest.

Circ. U.S. Dep. Agric. 828, 1949, pp. 23, bibl. 27, illus.

In this circular a comprehensive report is given of work done by the authors in Washington State during the period 1935-43, which has hitherto been reported only in scattered publications. The best methods of scraping the trees to remove hibernating larvae and eliminate cocooning quarters, and of banding the trunks or limbs with beta-naphthol-treated bands are described. For the best results, these two practices should be used together. Statistical data are given on the distribution of overwintering codling moth larvae, the proportion of larvae removed by scraping and caught in the bands, and the effect of scraping and banding on the quality of the crop. In tests in sprayed orchards, the average increase in clean fruit, obtained as a result of scraping and banding, was 37.5%. It is observed, however, that little emphasis is now placed on these practices, because of the effectiveness of DDT sprays, the high cost of labour, and the development of trunk sprays [see *H.A.*, 17: 714], which are equally effective and less expensive.

1511. KOROLEVA, N. I.

The long lasting effect of DDT for the control of codling moth. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 22-5.

DDT at 0.06% in a 1% mineral oil emulsion is to be preferred to arsenical insecticides for the control of codling moth as being effective over a longer period. DDT dust is also useful but is less persistent, being more easily removed by wind and rain.

1512. MICHELbacher, A. E., AND MIDDLEKAUFF, W. W.

Codling moth investigations on the Payne variety of English walnut in Northern California.

J. econ. Ent., 1949, 42: 736-46, bibl. 1.

Further investigations [see also *H.A.*, 16: 783] carried out at Linden, California, on control of codling moth, *Carpocapsa pomonella* (L.), resulted in a general recommendation to spray with standard lead arsenate (3 lb. + safener (Delmo Z 1 lb.) + 14% nicotine dry concentrate 1 lb. + light medium summer oil emulsion 80-83% oil $\frac{1}{2}$ gal. + 100 gal. water). One properly applied spray in May was found satisfactory, a second spray improved control but did not justify the cost of application. DDT plus addition of an aphicide resulted in excellent control, but cannot be recommended until a satisfactory method for controlling mites is developed.

1513. MYBURGH, A. C.

The toxicity of fruit fly baits to *Pimpha heliophila*, Cam. (Hymenoptera) a parasite of the codling moth.

J. ent. Soc. sthn Afr., 1948, 10: 170-4, bibl. 4, from abstr. in *Rev. appl. Ent.*, 1950, 38: 45-6.

The results showed that sodium fluosilicate, which is the standard poison recommended against the fruit-fly in South Africa, and water-dispersible DDT, which was much less effective, are both highly toxic to *Pimpha*, whereas BHC, which was promising against the former, is not.

1514. TASCHENBERG, E. F.

Laboratory evaluation of larvicides for red-banded leaf roller and notes on injury to grapes.

J. econ. Ent., 1949, 42: 629-32, bibl. 3, illus.

The red-banded leaf roller, *Argyrotaenia velutinana*, was found more commonly in vineyards during 1948 than previously, and there is a possibility of its becoming a pest on grapes. A few observations are made on its occurrence and damage. In laboratory tests at the New York State Agricultural Experiment Station, dichlorodiphenyl dichloroethane proved very effective against newly hatched larvae; it was more toxic than DDT and killed more rapidly. Lead arsenate was as effective as DDT, but even slower in action. Parathion gave a very good kill at exceedingly low concentrations.

1515. ANTHON, E. W.

How to control peach tree borer.

Bett. Fr., 1950, 44: 8: 6, 8.

Formulations of ethylene dichloride and propylene dichloride are tabulated and dosages are specified according to age of tree. A circular trench is made 1-2 in. from the trunk of the tree and the diluted emulsion is poured into it. Where borer injury is above ground, the soil should be raised above the injured portion. Finally, the trench is covered with soil to prevent evaporation of the liquid. These applications, which are directed against the larvae, should preferably be made between 20 September and 2 October (in Washington).

1516. HIDDINK, G. J.

De wintervlinder in het seizoen 1948-1949.

(The winter moth in the 1948-1949 season.)

[English summary 8 lines.]

Tijdsch. PlZiekt., 1950, 56: 91-5.

The main flight of the winter moth (*Cheimatobia brumata*) occurred about the middle of November, no female moths being found on the grease bands after 30 November. Belle de Boskoop was more heavily infested than Groninger Kroon and Brabantse Belle-fleur. The female moths prefer the south side of the stem; some passed the grease bands. In misty weather the moths are active in the daytime.

1517. BLASZYK, P., AND HOLZ, W.

Beobachtungen über das Frostspannerauftreten (*Cheimatobia brumata*) zwischen Weser und Ems und die Bedeutung des Leimringverfahrens. (Winter moth in the region between the Weser and the Ems, Germany.)

NachrBl. dtsh. PflSchDienst., 1950, 2: 54-6.

Winter moth infestation, observed in 27 localities, was heaviest on fruit trees grown near oaks. Grease banding gave good control.

1518. RASKI, D. J., AND BORDEN, A. D.

A green fruitworm, *Orthosia hibisci*, attacking apricots.

J. econ. Ent., 1949, 42: 754-6, bibl. 5.

The first record in California is made of damage caused by a green fruitworm, *Orthosia hibisci* (Guenée), on apricot. The larvae are primarily leaf feeders but also gouge small holes in green fruit resulting in culls

at harvest. There is apparently one generation a year and the only definite host recorded was apricot. Controls recommended include cryolite dust, 5% DDT dust or 2 lb. of 50% wettable DDT to 100 gal. water applied as soon as the larvae are discovered. [Authors' summary.]

1519. CARLSON, F. W., AND NEWCOMER, E. J.
Habits and control of the pear psylla in Washington.

Proc. 63rd Conv. Amer. pomol. Soc.,
Yakima, Wash., Dec. 1948, 1949, pp. 113-16.

Parathion, toxaphene and rotenone all gave good control of pear psylla, but whereas the first two are effective against mites, rotenone is not so good. Nicotine sulphate does not control mites though it does control psylla. Benzene hexachloride cannot be recommended.

1520. O'NEILL, W. J.

Pear psylla control with parathion.

J. econ. Ent., 1949, 42: 636-9, bibl. 3.

Parathion proved to be effective against the egg, nymph and adult stages of pear psylla. It gave excellent control in orchards in Washington State in 1948. For maximum control it is suggested that all pear trees within the infested area should be sprayed at approximately the same date, in order to minimize inter-orchard migration of adult psylla.—Fruit Tree Experiment Station, Wenatchee, Wash.

1521. FREY, W.

Über die Wirksamkeit neuerer Kontaktinsektizide auf die Kohlrübenblattwespe (*Athalia colibri* Christ.) und die gelbe Stachelbeerblattwespe (*Pteronotus ribesii* Scop.) (The action of the newer contact insecticides on turnip sawfly and gooseberry sawfly.)

Reprinted from *Anz. Schädlingssk.*, 1949, 22: 129-34, bibl. 15.

In laboratory trials E605 proved very satisfactory against both insects, while DDT failed. BHC gave good control of gooseberry sawfly but not of turnip sawfly.—Biol. Zentralanst. Kiel-Kitzeberg.

1522. VAN DE VRIE, M.

Bestrijding van de appelzaagwesp (*Hoplocampa testudinea* Klug.). (Control of the apple sawfly.) [English summary ½ p.]
Meded. Dir. Tuinb., 1950, 13: 139-49.

Trials in North Beveland and South Beveland (islands of southern Holland) showed that the apple sawfly can be controlled with HCH preparations applied soon after petal-fall before the larvae are hatched. If the applications are later, nearly all the hatched larvae will be killed but will have already caused damage. Parathion preparations were less effective. The larvae hatched from the eggs deposited in the late blossoms are also killed by an early application of HCH.

1523. ANON.

The almond pest, *Eurytoma*.

Countryman, Nicosia, 1950, 4: 1: 7.

As proved by insecticides, including DDT and BHC, has proved ineffective, hand collection and burning of blackened fruits during the winter remains the only effective means of control.

1524. SUIRE, J.

Le pou de San José. (The San José scale.)

Progr. agric. vitic., 1950, 133: 114-19, illus.

A general survey of the history, morphology, life-cycle and control of the San José scale insect, *Quadraspidiotus perniciosus* Comst.

1525. STAFFORD, E. M.

Control of olive scale in California with parathion.

J. econ. Ent., 1949, 42: 656-60, bibl. 4.

Winter sprays of parathion on olives and peaches delayed oviposition by the olive scale (*Parlatoria oleae*) in the spring, but did not give satisfactory control. Spring sprays gave good control. Parathion appeared to be particularly effective against eggs and immature scales. Spring dusts were less effective on olives than on peaches, for the oviposition and hatching periods on the latter are much shorter. Two applications of a 2% parathion dust on olives on 13 July and 2 August, 1948, at the rate of 150-200 lb. per acre, markedly reduced the number of infested fruit. Studies of deposit persistence and penetration have not yet been completed.—University of California, Davis.

1526. CHANDLER, S.

Dormant spray for scales, mites and aphids.

Down to Earth, 1950, 5: 4: 14.

DN-289 (contains 8 oz. triethanolamine salt of dinitro-o-sec-butyl-phenol per quart) at 2 quarts per 100 gal. has given good results on apples in one season against San José scale and European red mite eggs and apparently against aphid eggs. Spraying when buds had started to break caused severe damage to trees.—Illinois nat. Hist. Survey.

Birds.

1527. MENZEL, R.

Knospenbeschädigungen durch Vögel. (Bud injury by birds.)

Schweiz. Z. Obst- u. Weinb., 1950, 59: 176-7.

A brief description of bird injury to leaf and flower buds and even to flowers of fruit trees. Tits and other birds are involved, but the worst offender is the bullfinch which lives on buds throughout the cold season. Explosive bird scarers are recommended, but winter washes are thought to have a deterrent effect on bullfinches.

1528. HAYNE, D. W., AND CARDINELL, H. A.

Damage to blueberries by birds.

Quart. Bull. Mich. agric. Exp. Stat., 1949, 32: 213-19, illus.

The authors found that damage due to birds was enough to justify the expense of protective measures for small plantations in Michigan.

Rodents.

1529. MANSFELD, K.

Erdmaus (*Microtus agrestis* L.) als Schädling an Erdbeeren. (Mice as strawberry pests.)

NachrBl. dtsh. PflSchDienst, 1948, 2: 190 [received 1950].

Damage to a strawberry bed, in which the ripe berries were found lying on the ground, was traced back to a mouse (*Microtus agrestis*) biting through the pedicel. Similar damage to currants, observed earlier, was shown to be due to the mouse *Apodemus sylvaticus*.

1530. FINLEY, J.

Mouse control in orchards.

Proc. 63rd Conv. Amer. pomol. Soc., Yakima, Wash., Dec. 1948, 1949, pp. 103-6.

The necessity is stressed for placing poisoned bait on or very close to mouse trails or it will be useless. Zinc phosphide and strychnine prove best. Strychnine on oats is excellent and is not toxic to game birds or poultry. Zinc phosphide has proved better in the eastern States but is more difficult to prepare and is very toxic to all forms of animal life. Repellent paint can be applied only when the trees are dormant and is effective for 2 to 6 weeks.

1531. HAYNE, D. W.

A further test of cottontail repellents for garden use.

Quart. Bull. Mich. agric. Exp. Stat., 1950, 32: 373-7, illus.

Six repellents were tested in a further [see *H.A.*, 19: 2956] pen trial. Good-Rite Z.I.P. 5% (a chemical deer repellent) was markedly superior to other materials; tobacco dust and G. and O. rabbit repellent followed.

Antibiotics.

(See also 1587, 1668, 1790, 2085i.)

1532. GOTTLIEB, D., HASSAN, H. H., AND LINN, M. B.

Actidione as a plant protectant.

Phytopathology, 1950, 40: 218-19.

The results obtained with 6 pathogenic fungi indicate that growth retardation began at concentrations between 0.1 and 1.0 p.p.m. All the fungi except *Sclerotinia fructicola* were inhibited by 100 p.p.m. Tomato, bean, geranium, peach, and strawberry plants were all injured, except strawberry not in active growth at the time, with actidione at 1,000 and 100 p.p.m.

1533. DARPOUX, H., AND FAIVRE-AMIOT, A.

Essais d'application des propriétés antagonistes de divers microorganismes et des substances antibiotiques dans la lutte contre les maladies des plantes. (**Antibiotic trials.**)

C.R. Acad. Agric. Fr., 1950, 36: 158-61.

Substances derived from a number of micro-organisms were found to have antibiotic effects when applied to certain plant parasites. The hosts and parasites used were: (1) sunflower—*Sclerotinia libertiana*, (2) melon—wilt disease, (3) tobacco—*Pseudomonas tabaci*, (4) tomato—*Alternaria solani*, (5) barley—mildew, *Erysiphe graminis*, (6) apple—mildew, *Podosphaera leucotricha*, (7) tomato—crown gall, *Agrobacterium tumefaciens*.

1534. B., G.

Streptomycin förstör förmåga att bilda klorofyll. (**Streptomycin destroys the capacity to form chlorophyll.**)

Arb. svensk Jordbr. Forskn., 1950, p. 98.

A brief observation on the results of unspecified

experiments showing that streptomycin produces mutants of green plants which have lost the capacity to form chlorophyll. The effect is so remarkable that it may be possible to base a technique for the bioassay of streptomycin on it.

Sprays and spraying.

1535. REICH, H.

Die wichtigsten Ergebnisse der Spritzversuche des Jahres 1949. (**The most important results of spraying experiments in 1949.**)

Mitt. ObstbVersuchsring, Jork, 1950, No. 3/4, pp. 10-15.

Numerous large-scale spraying trials at the Jork fruit experimental station in northern Germany were carried out, mainly on apples. Eighty-five different materials were tested. Of 27 new winter washes only 9 were found useful. The superiority of DNK carbolineums over other sprays was confirmed. Excellent results were achieved in scab control with copper-lime and organic fungicides, e.g. "Fuklasin".

1536. BURRELL, A. B.

1949 results with concentrate sprays and air-blast sprayers in New York.

Amer. Fruit Gr., 1950, 70: 5: 27-8.

In the main growers achieved good results in scab control, with speed sprayers using double concentrates. [See *H.A.*, 19: 1109.] In experimental work tests were made with DDT, TEP and harvest hormones at increased concentration and reduced gallage. Growers are advised not to use higher than 4× concentrates. Modifications of machines are suggested.

1537. CHURCHILL, L. J.

Adapting home-made dusting machines for use on tractors fitted with hydraulic lifts.

Agriculture, Lond., 1950, 57: 128-30, illus.

Dusting machines described earlier (see *H.A.*, 18: 1078 and 19: 1103) can be mounted easily and cheaply on the hydraulic lifts of tractors by a method described in this article.

Fungicides.

1538. BORZINI, G.

Lo zolfo, suoi composti e derivati, nella lotta antiparassitaria in frutticoltura. (**Sulphur, its compounds and derivatives and their use against fruit diseases.**)

Humus, 1950, 6: 1: 9-14.

A general discussion prefaces an account of the uses of the different substances which contain sulphur against the diseases of common pome and stone fruits at particular stages of growth in Italy.

1539. BOUGARD, M., AND AERTS, P.-F.

Usage des bouillies sulfocalciques en arboriculture fruitière. (**Use of lime-sulphur sprays on fruit trees.**)

Arbres et Fruits, 1950, No. 46, pp. 24-8.

This popular account of the use of lime-sulphur sprays includes lists of sulphur-shy and copper-shy apples and pears.

1540. HOWARD, F. L., AND ROWELL, J. B.
Row-crop fungicide concentrate application.
Proc. Amer. Soc. hort. Sci., 1949, **54**:
 413-16, being *Contr. Rhode Island agric.*
Exp. Stat. 739.

Experience over 2 years is described with a garden tractor-mounted air-blast machine and with a field tractor-mounted mist-blower attachment. The requirements of these types of equipment are discussed.

1541. SUŠICKIĀ, L. A.
The preparation of copper naphthenate.
 [Russian.]
Sad i Ogorod (Orchard and garden), 1950,
 No. 2, pp. 25-6.

Details are given of the preparation of copper naphthenate which is said to be widely used as a substitute for bordeaux mixture in the control of fruit tree diseases such as apricot brown rot and clasterosporium leaf spot of stone fruit trees.

1542. GRAINGER, J., AND SIMPSON, D. E.
Electronic heating and control of seed-borne diseases.
Nature, 1950, **165**: 532-3.

Preliminary results obtained with *Helminthosporium avenae* were only partly satisfactory. It is hoped that the work now in hand on loose smut of barley may give the desired information on the potential value of radio-heating for the control of parasites transmitted within the seed.

Insecticides.

1543. WHEATLEY, G. A., AND MOCZARSKI, S. Z.
An insect barrier utilizing high-frequency current.
Nature, 1950, **165**: 766-7, illus.

Metal barriers, through which passes a 35-volt alternating current at 1,000 cycles/sec., are described and illustrated. The barriers have proved effective on pots containing peas to prevent non-flying insects subjected to treatments from escaping and would appear to have a much wider sphere of application.—*Nat. Veg. Res. Stat.*, Cambridge.

1544. FREAR, D. E. H., AND HILBORN, M. T.
Pest control materials, 1950.
N.E. region. Publ. Pa agric. Exp. Stat.
 No. 2, 1950, pp. 149, bibl. 6.

This brochure comprises the trade names of 4,022 preparations, their active ingredients, and an alphabetical list of companies supplying them.

1545. RIPPER, W. E., AND OTHERS.
Pest Control farmers' handbook.
 Pest Control Limited, Cambridge, 1950,
 100 pp., illus.

An account of the work of Pest Control Limited of Cambridge on the control of diseases, pests and weeds of agricultural and horticultural crops. It includes 16 coloured illustrations of the most common weeds. It contains directories of insecticides, fungicides and weedkillers, and of spraying machinery manufactured by the firm.

1546. MACLAGAN, D. S.
A new era in pest control.
Discovery, 1949, pp. 219-23, bibl. 12, illus.

Short notes on DDT, BHC and their uses and limitations, on other new synthetic insecticides, on insecticidal smokes and on progress towards the control of nematodes.

1547. GOLDBERG, M.
New trends noted in agricultural insecticides.
Agric. Chemls, 1950, **5**: 39, 86.

Deals chiefly with the acaricide and insecticide EPN—ethyl-p-nitrophenol thionobenzene phosphonate, which is stated to be safer than parathion. English experiments with the systemic insecticide Pestox 3 are also briefly discussed.

1548. SPEYER, W.
 Haben die modernen Kontaktgifte eine ovicide Wirkung? (Do modern contact insecticides have an ovicidal action?)
NachrBl. dtsch. PflSchDienst, 1950, **2**:
 2-3.

Results of experiments on eggs of *Bruchus rufimanus*, *Phalera bucephala*, *Agelastica alni* and *Pieris brassicae* treated with E605, Gamma-Nexit-Neu, Gix and Gesarol indicate that although the insecticides did not kill the embryo inside the egg, no larvae hatched out during any of the numerous tests.—*Inst. vegetable and oil seed pests*, Kiel-Kitzeberg.

1549. HAMMARLUND, L.
 Erfaringer med nyere insecticider. (Trials with insecticides.) [English summary $\frac{1}{2}$ p.]
 Reprint from *St. plantepat. Fors.*, *Maaned-sov.* 308, pp. 3.

The following results, among others, are recorded: Bladan E605 and Midol Tio (BHC, parathion and azobenzene) were effective against apple capsid and apple sucker, while DDT and rotenone emulsions controlled only the former. Carrot fly was controlled by watering with Bladan E605 and emulsions of BHC and of BHC+azobenzene. Methyl bromide fumigation proved successful against the nut gall mite, *Eriophyes avellanae*.

1550. RIPPER, W. E., GREENSLADE, R. M., AND HARTLEY, G. S.
A new systemic insecticide bis (bis dimethyl-amino phosphonous) anhydride.

Bull. ent. Res., 1950, **40**: 481-501, bibl. 13.
 Bis (bis dimethylamino phosphonous) anhydride is shown to be a systemic insecticide when sprayed on the leaves of numerous plants. The translation of it from one part of the plant to another, over distances varying from the thickness of a leaf to three feet, was shown with *Aphis fabae*, *Myzus persicae*, *Brevicoryne brassicae*, *Macrosiphoniella sanborni* and *Pseudococcus citri*. It is not found to be toxic to non-plant-sucking insects, notably predators and parasites. It is, therefore, a selective insecticide for the control of aphids, and field experiments have shown that treatment with it gives plants prolonged toxicity to aphids and allows the parasites and predators to keep in check any survivors or newly arrived individuals. Chemical and physical properties and formulations are reported. Extensive field experiments have proved that a formulation containing 66% of the substance is valuable for the control of aphids and red spider: (a) Two applications of $\frac{1}{2}$ lb. in 100 gal. of water per acre kept hops free

from red spider and aphids during the growing season under English climatic conditions. (b) An application of 7 lb. in 100 gal. per acre against *Brevicoryne brassicae* on cabbage and brussels sprouts kept the plants practically free from aphids for a period of over five weeks during the very severe cabbage-aphis outbreak of 1949. (c) On strawberries, two applications of 1½ lb. in 100 gal. per acre kept the plants free from the strawberry aphis (*Capitophorus fragariae*). (d) On roses, one spray of 1 lb. in 100 gal. effected satisfactory control of the rose aphis (*Macrosiphum rosae*). (e) 7½ lb. in 100 gal. per acre effected practical control for three weeks of *Myzus persicae* on tobacco in Rhodesia. The anhydride is not so toxic as parathion, Paraoxon or HETP, but it is nevertheless a very toxic compound. Suggestions for the treatment of casualties are reported. Precautions for use in the field should include the use of protective caps on tractors to prevent the spray drift from reaching the operator and the wearing, by persons handling the concentrate, of overalls and rubber gloves to avoid skin contact. A method of analysis for bis (bis dimethylamino phosphonous) anhydride in plant material is described. [From authors' summary.]

1551. LHOSTE, J.

Le dinitro o. cresol. Produit de base pour les traitements d'hiver. (Dinitro-o-cresol as a basis for winter washes.)

Arbres et Fruits, 1950, No. 46, pp. 36-7, bibl. 10.

A general account of the use of DNOC as a winter wash combined with tar or paraffin oils or with an ammonium salt.

1552. HUNTER, D.

Parathion sprays need special handling.

Grower, 1950, 33: 470-3, illus.

Parts of a lecture on the protection of workers against injury from DNOC and parathion, reproduced from the *British Medical Journal*.

1553. DAVID, W. A. L.

Sodium fluoroacetate as a systemic and contact insecticide.

Nature, 1950, 165: 493-4, bibl. 7.

The fact that sodium fluoroacetate occurs in the South African plant *Dichapetalum cymosum* suggested to the author the possibility that the poison might be tolerated by other plants. In tests against *Aphis fabae* the chemical was found to have a marked contact action, but it proved to be also a powerful systemic insecticide. As little as 1 mg. added to a 3½-in. diameter pot containing about 400 g. of soil freed a broad bean plant from aphids in 5 days, and the treated plants remained toxic to aphids for 10 days or more. As observations failed to show any vapour action of the solution or any transpiration of the toxic substance by the treated plant, it is concluded that the aphids are poisoned by the sap. A 0.0005% solution of the fluoroacetate was also effective systemically against the chrysanthemum and the pea aphid. In preliminary trials broad bean plants began to show injury at about 50-100 times the dose necessary to kill *Aphis fabae*. Fluoroacetate gave a complete kill at considerably lower concentrations in the soil and in the plant than did bis (bis dimethylamino) phosphonous anhydride. Mammalian toxicity

was found to be high. In the present state of knowledge the compound cannot be recommended as an insecticide in view of the unknown hazards involved.—Agric. Res. Coun., Unit of Insect Physiol.

1554. VELBINGER, H. H.

Veratrin-Intoxikation bei Insekten. Beitrag zur Toxikologie der Alkaloide. (Veratrine poisoning in insects. Contribution to the toxicology of alkaloids.)

Süddtsch. Apothekerztg, 1947, No. 9, pp. 220-8, bibl. 21, illus., from abstr. in *Rev. appl. Ent.*, 1950, 38: 51-2.

A study in connexion with the control of certain orchard pests, of the toxicology of veratrine, the active principle of the white hellebore, *Veratrum album*, which grows wild in the Rhodope mountains of Bulgaria. The insecticidal action of the extract from *V. album* was much inferior to that of medicinal veratrine, the effectiveness of which was probably due to its content of cevadine. Veratrine acted chiefly as a contact poison and was effective against a great number of different insects.

1555. SMITH, C. F., JONES, I. D., AND RIGNEY, J. A.

Effect of insecticides on the flavor of peaches —1948.

J. econ. Ent., 1949, 42: 618-23, bibl. 5.

In flavour tests of sprayed peaches, made at the North Carolina Agricultural Experiment Station, benzene hexachloride was found to affect the flavour of fresh and canned fruit, except, in the case of canned fruit, where it was used in the petal-fall and calyx-fall sprays only. There was wide variation in the effects of parathion and chlordan on fruit flavour. The results of spray residue analyses are also recorded.

1556. BAILEY, J. S., ESSELEN, W. B., JR., AND WHEELER, E. H.

Off-flavors in peaches sprayed with benzene hexachloride.

J. econ. Ent., 1949, 42: 774-6, bibl. 4.

Fresh, frozen and canned fruits of 36 peach varieties from trees sprayed with BHC to control plum curculio were tasted. The canned peaches had an off-flavour attributed to the spray, while in the fresh and frozen fruits no off-flavour was detected.

1557. RECKENDORFER, P.

Der Arsenschaden. (Arsenic damage.) [English summary.]

PflSch. Ber. Wien, 1950, 4: 1-10, bibl. 12.

An experiment was carried out on beans to determine the highest amount of arsenic which can be contained by the plant cell without causing visible arsenic injury. It was found to be $10^{-6}\gamma$ As_2O_3 .

1558. HILBRICH, P.

Sind Obstbaumspritzungen mit "Nexen", "Viton" und "E605" für Geflügel schädlich? (Are the sprays "Nexen", "Viton" and "E605" harmful to poultry?) *NachrBl. Biolog. Zentralanst. Braunschweig*, 1949, 1: 158-9.

Numerous tests carried out at the Research Station

for small animals, Celle, Germany, indicate that the amount of poison poultry can pick up under sprayed fruit trees is not toxic.

1559. McCALLAN, S. E. A.

Factors influencing spray injury by glyoxalidine derivatives to potted apple trees.

Contr. Boyce Thompson Inst., 1950, **16**: 21-6, bibl. 15.

Spray injury from glyoxalidine derivatives was induced on leaves of potted McIntosh apple trees on dwarf Malling IX stock, under laboratory conditions. High concentration of spray, high temperature (90° F. or above) and high humidity were the most important factors. [From author's summary.]

1560. SHAW, F. R., AND BUTLER, G. D.

The effects of DDT, benzene hexachloride and parathion on the honeybee.

J. econ. Ent., 1949, **42**: 855-6, bibl. 4.

During laboratory and field tests parathion and BHC were found highly toxic to bees, while DDT under field conditions was less so.

1561. BRÖKER, U.

Bienensterben durch Gesarol (DDT). (Gesarol kills bees.)

Bienenfreund, 1949, No. 10, p. 168.

Contrary to the theory that DDT is not dangerous to bees, because at hive temperatures it is less poisonous, the author believes that it is more dangerous than BHC and E605. At lower vapour pressure it does not act as a deterrent but only "stupefies" the bees and allows them to come into direct contact with, and succumb to, the poison. O.J.

Insecticidal plants.

(See also 2168.)

1562. HAGEMAN, R. H., AND PAGÁN, C.

The effect of ridging on ease of harvest, root distribution, and toxic constituents of *Derris elliptica* (abridged).

From summary in *Agron. J.*, 1950, **42**: 108.

Three methods of cultivation were compared: (1) level ground, (2) 8 in. ridges, (3) 16 in. ridges, and different methods of harvesting applied 30 months later. Amongst conclusions reached were the following: The root yields grown on all three levels were the same; 95% of total weight of roots was found in the top 18 inches of soil; harvesting roots from the ridges was easier than from level land; mechanical harvesting was 3-4 times faster than manual, though only 75% of the roots were recovered, and all chemical and biological toxicity values decreased as the height of the ridge increased.

1563. STOFFELS, E. H. J.

Corrélations et efficiences d'un groupe de *Pyrethrum cinerariaefolium* Preg. (Correlations and efficiency in *Pyrethrum cinerariaefolium*.) [English summary $\frac{1}{2}$ p.]

Bull. Inst. agron. Gembloux, 1948-49, **17**: 174-80.

The extent of variation occurring between individual

plants is a good measure of the improvement that may be achieved by selection. This factor was studied in a sample of 696 pyrethrum plants. Monthly counts of the number of flowers per plant were taken. It was found that plants must be kept under observation for at least 7 months before they can reliably be classified as belonging to a certain production group. Much variation in production was recorded, indicating great potential improvement.

1564. DORMAL, S.

La synthèse des principes actifs du pyrèthre.

(Synthesis of the active principles in pyrethrum.)

Bull. agric. Congo belge, 1950, **41**: 203-4.

A note on the synthesis by the Bureau of Entomology and Plant Quarantine in the U.S.A. of the active principles in pyrethrum. The process has not yet reached the stage of commercial production and the natural product should hold its own for some time to come.

1565. ACREE, F., JR., AND HALLER, H. L.

Wilfordine, an insecticidal alkaloid from *Tripterygium wilfordii* Hook.

J. Amer. chem. Soc., 1950, **72**: 1608-11, bibl. 12.

The root bark extract of the perennial vine, *T. wilfordii*, is used in China as an insecticide. The active principle, a crystalline alkaloid, has been isolated and has been designated wilfordine.

Noted.

1566.

a ASQUITH, D.

Oils in dormant sprays to control European fruit lecanium and terrapin scale on peach.

J. econ. Ent., 1949, **42**: 624-6, bibl. 4.

b BAND, A. B., COTTIER, W., AND LE PELLEY, R. H.

Biological control.

Repr. Rep. 5th Commw. Ent. Conf., 1948, pp. 60-72.

Three papers followed by a discussion.

c BORTELS, H.

Über die Abhängigkeit der Virulenz und anderer Eigenschaften pflanzenpathogener Bakterien sowie des Infektionserfolges vom Wetterverlauf. (The influence of weather conditions on the virulence and other properties of plant-pathogenic bacteria and on the susceptibility of the host.)

Reprinted from *Phytopath. Z.*, 1949 [?], **15**: 376-93, bibl. 22.

For abstract of preliminary communication see *H.A.*, 18: 365.

d BRÉMOND, P., AND OTHERS.

Parasites et affections diverses de l'olivier. (Pests and diseases of the olive.)

Trav. Serv. Déf. Vég. Rabat, 1948, 12 pp., illus.

- e FATTINGER, D.
Die Beeinflussung der fungiziden Wirksamkeit des Kupferions durch andere Ionen. (The effect of other ions on the fungicidal action of the copper ion.) [English summary $\frac{1}{2}$ p.]
PflSch. Ber. Wien, 1950, 4: 33-46, bibl. 4.
- f GUPTA, S. L.
Occurrence of chestnut-blight [*Endothia parasitica*] in the Kumaon Hills.
Curr. Sci., 1950, 19: 13-14, bibl. 4, illus.
- g HOLZ, W.
Apfel- und Birnenschorf. (Apple and pear scab.)
Flugbl. Biol. Zentralanst. Braunschweig K4, 1950, pp. 8.
- h TEN HOUTEN, J. G., AND KRAAK, M.
A vertical spraying apparatus for the laboratory evaluation of all types of liquid pest control materials.
Ann. appl. Biol., 1949, 36: 394-405, bibl. 5, illus.
- i KELSHEIMER, E. G., AND WALTER, J. M.
Soil fumigation can be inexpensive.
Down to Earth, 1949, 5: 3: 12-13, illus.
A shortened version of the paper abstracted in *H.A.*, 19: 3182.
- j LAPLANTE, A. A., Jr.
Contact toxicity of several formulations of DDT to first instar oriental fruit moth larvae.
J. econ. Ent., 1949, 42: 786-95, bibl. 5, illus.
- k MEHL, S.
Die Wühlmaus (*Arvicola terrestris* Linné = *A. amphibius* Linné). (The *A. terrestris* mouse species.) *Flugbl. Biol. Zentralanst. Braunschweig C2*, 1950, pp. 12.
- l MEHL, S.
Die Feldmaus (*Microtus arvalis* Pallas). (Field mouse control.)
Flugbl. Biol. Zentralanst. Braunschweig C5, 1950, pp. 12.
- m MORSTATT, H.
Bücher über Pflanzenpathologie und Pflanzenschutz. Eine Bibliographie. (Books on plant pathology and plant protection. A bibliography.)
Mitt. Biol. Zentralanst., Berlin-Dahlem, H.68, 1950, pp. 52.
- n NEWCOMER, E. J., AND DEAN, F. P.
Comparative effectiveness of orchard acaricides.
J. econ. Ent., 1949, 42: 857-8.
- o PIMENTEL, A. A. L.
A *Phytophthora cinnamomi* Rands, um outro agente, extremamente virulento, da "doença da tinta" do castanheiro. (*Phytophthora cinnamomi*, another very virulent pathogen of the "ink disease" of chestnut.) [English summary $1\frac{1}{2}$ pp.]
Agron. lusit., 1947, 9: 188-91, bibl. 15 [received 1950].
- p PITCHER, R. S.
On the biology of gall midges of the genus *Thomasiniana* Strand, E. 1916.
Thesis [typed] London Univ., 1949, pp. 105, bibl. 29+40 illustrations [in East Malling Library].
Mainly on the raspberry cane midge (*Thomasiniana theobaldi* Barnes).
- q PRADHAN, S.
Effect of concentration on temperature coefficient of DDT action on insects.
Curr. Sci., 1950, 19: 12-13, bibl. 2.
- r RINGS, R. W.
Red-banded leaf roller injury to peaches and plums.
J. econ. Ent., 1949, 42: 701-2, bibl. 1, illus.
- s SCHMIDT, T.
Das Auftreten wichtiger Krankheiten und Schädlinge an Kulturpflanzen in Österreich im Jahre 1949. (Incidence of the more important pests and diseases of cultivated plants in Austria in 1949.)
PflSch. Ber. Wien, 1950, 4: 84-94.
- t SHAW, W. C.
An efficient sprayer for application of chemical sprays to experimental field plots.
Agron. J., 1950, 42: 158-60, illus.
- u SOÓS, I.
A szőlőn előforduló penészgombák hatása a szőlő és a must összetételére. (Effects of moulds on the composition of grapes and must.) [English summary $\frac{1}{2}$ p.]
Bull. Hungarian agric. Exp. Stat., 1947, 47/49: 33-40.
- v SPEYER, W.
Wurmstichige Äpfel und Birnen. (Grubs in apples and pears.)
Flugbl. Biol. Zentralanst. Braunschweig K9, 1950, pp. 8.
- w STEINER, G.
Aims and problems of soil fumigation.
Down to Earth, 1949, 5: 2: 2-4.
Review by the Chief Nematologist, U.S. Dep. Agric., Beltsville.
- x THIEM, H.
Von Schildläusen, ihrer Ausbreitung, Entwicklung und Unterscheidung. (Spread, development and varieties of scale insects in Germany.)
NachrBl. dtsch. PflSchDienst, 1950, 2: 33-5, bibl. 7, illus.
- y VIDAL, J.
Hémiptères de l'Afrique du Nord et des pays circum-Méditerranéens. (The hemiptera of North Africa and the Mediterranean countries.)
Mém. Soc. Sci. nat. Maroc, 1949, No. 48, pp. 238, bibl. 103, illus.
- z THIRUMALACHAR, M. J., RAO, D. V. S., AND RAVINDRANATH, V.
Telio of the rust [*Cerotelium fici*] on cultivated figs.
Curr. Sci., 1950, 19: 27-8, bibl. 2.

WEEDS AND WEED CONTROL.

(See also 1202, 1224-1234, 2123.)

Herbicides.

1567. ORCHARD, H. E.

Use hormone-like weedkillers with care.

J. Dep. Agric. S. Aust., 1950, 52: 252-5, bibl. 4, illus.

Only with the greatest care should the hormone weedicides 2,4-D, MCPA, and 2,4,5-T be used close to flowers, shrubs, vegetables or other valuable plants. Spraying should be carried out only on days when there is little or no wind, and valuable plants should be protected with shields made of heavy paper, canvas, oilcloth, light wood or metals. The injury caused to plants by the weedkillers is illustrated, and necessary precautions are noted. Lists are given showing crop plants, flowering plants and ornamentals, and trees that are susceptible to injury from the chemicals mentioned or from mixtures of them.

1568. CRAFTS, A. S., AND HARVEY, W. A.

Chemical structure and action of herbicides.

Agric. Chemls., 1950, 5: 38-41, 89-91.

A brief survey of the subject, including the action of soil fumigants as herbicides.

1569. MOORE, R. M.

Differential effects of certain phenoxyacetic acid compounds and phenylcarbamates on plant species. I. Effect of applications to the soil prior to emergence.

Aust. J. agric. Res., 1950, 1: 52-63, bibl. 6, illus.

Investigations were conducted in glasshouse and field to determine the effects of pre-emergence applications of certain phenoxyacetates and phenylcarbamates on plant species. The effects of both types of compounds on the establishment of all monocotyledons and dicotyledons tested and on the ear formation and grain yield of a cereal, *Triticum vulgare*, are described. The phenoxyacetates, applied in 0.1% concentrations, markedly inhibited all the dicotyledonous species. Monocotyledons were, in general, more tolerant than the dicotyledons, but were affected at the higher concentrations. The phenylcarbamates produced toxic responses, in varying degrees of intensity, on all the graminaceous species tested, but affected only one dicotyledon, viz. *Linum usitatissimum*. Symptoms of toxicity are described and some factors which appeared to govern their intensity are noted. [Author's summary.]—C.S.I.R.O.

1570. SCHÖNBRUNNER, J.

Selektive Unkrautbekämpfung unter besonderer Berücksichtigung der Hormonderivate. (Selective weed control with special reference to hormone derivatives.) [English summary ½ p.]

PflSch. Ber. Wien, 1950, 4: 65-83, bibl. 13, illus.

Various weed killers were tested on cereals, onions, pastures and waste land. Results of experiments in onion fields indicate that under the conditions of the experiment hormone preparations, including sodium salts of 2,4-D, were not effective weed killers.

Particular weeds.

1571. BAKKE, A. L.

Controlling Canada thistle with 2,4-D.

Iowa Farm Sci., 1949, 4: 25, illus.

Although Canada thistle [*Cirsium arvense*] is resistant to 2,4-D, it can be effectively controlled if applications are timed accurately and are repeated a second year.

1572. PIENAAR, A. J.

The American bramble, a menace to pastures: control with chemical weed-killers.

Fmg S. Afr., 1950, 25: 79-81, bibl. 8.

Experiments are described on the eradication of *Rubus fruticosus* var. *bergii*. Frequent mowing was effective, as was spraying with 10% ammonium sulphamate at 320-390 gal. per acre, preferably at the fruiting stage. Sodium chlorate was less effective and too expensive, and the sodium salt of 2,4-D gave no control at any stage in concentrations up to 1.5%.

1573. FISHER, C. E.

Mesquite control.

Down to Earth, 1950, 5: 4: 5-7, illus.

Promising results have been obtained in the eradication of mesquite shrubs from grazing lands by aeroplane spraying with 2,4-D and 2,4,5-T.—Texas agric. Exp. Stat.

1574. GAERTNER, E. E.

Studies of seed germination, seed identification, and host relationships in dodders, *Cuscuta* spp.

Mem. Cornell agric. Exp. Stat. 294, 1950, pp. 56, bibl. 153, illus.

A review of the literature and original data are presented on the germination and identification of dodder seed, and a host index is given for 9 species and 1 variety of the parasite. Six hundred and nine plant species, including several horticultural crops, are reported as being parasitized by *Cuscuta* spp.

1575. SARFATTI, G.

Ricerche sulla flora infestante delle colture in Italia. II. La flora infestante del podere "Cascine" (Firenze). (Weeds of cultivated land in Italy. II. On the Cascine estate, Florence.) [English summary 1½ pp.] *Nuov. G. bot. ital.*, 1949, 56: 21-57.

SCARAMUZZI, F.

Ricerche sulla flora infestante delle colture in Italia. III. La flora infestante di alcune colture presso Bari. (Weeds of certain crops in the Bari district.) [English summary 1 p.]

Nuov. G. bot. ital., 1949, 56: 58-105, bibl. 27.

The weeds are differentiated according to type of crop including horticultural crops, and according to season. Cultural operations affect their incidence and are noted. Particular weeds and their occurrences and habitats are discussed.

1576. ANON.

St. John's Wort, a dangerous weed.*Fmg S. Afr.*, 1950, 25: 61-3, illus.

This poisonous weed, *Hypericum perforatum* var. *angustifolium* DC., unwittingly introduced from Australia, has spread to an alarming extent in the south-western Cape. Attempts have been made to eradicate it by spraying with 2,4-D, but it may well have spread into inaccessible places where eradication would be difficult. The weed is here described to assist in its identification and avoid confusion with indigenous species of *Hypericum*.

1577. PETTEY, F. W.

The biological control of prickly pears in South Africa.*Sci. Bull. Dep. Agric. S. Afr.* 271 (Ent. Ser. 22), 1946-7, pp. 163, bibl. 133, 1s. [received 1950].

The use of the following enemies of *Opuntia megacantha* is considered: *Cactoblastis cactorum*, *Dactylopius opuntiae*, *Lagochirus funestus*, *Cactoblastis doddi*, and *Moneilema ulkei*, together with a note on the jointed cactus, *Opuntia aurantiaca* and its possible biological control.

Weed control in vegetables.

1578. BRADBURY, D., AND ENNIS, W. B., Jr.

Effect of ammonium 2,4-dichlorophenoxyacetate on stomatal behaviour.Abstr. in *Amer. J. Bot.*, 1949, 36: 821.

Aqueous solutions containing various concentrations of ammonium 2,4-dichlorophenoxyacetate were applied to bean seedlings in several different ways. Microscopic observations of the lower epidermis of the leaves showed that more stomata were closed or partially closed in the treated plants than in the untreated ones. The stomatal behaviour of 7 other species of plants to a soil application of the compound was similar to that of the bean. Water loss from kidney beans given a soil application or top application of ammonium 2,4-dichlorophenoxyacetate was less per sq. cm. of leaf surface than the water loss from untreated plants.—Camp Detrick, Frederick, Md.

1579. TEMPLEMAN, W. G., AND WRIGHT, J. O.

Weed control in root crops by pre-sowing applications of iso-propylphenylcarbamate and mixtures of that substance and "Methoxone" or 2,4-dichlorophenoxyacetic acid.*Nature*, 1950, 165: 570-1, bibl. 2.

In preliminary trials during the past 2 years (1) iso-propylphenylcarbamate, (2) "Methoxone" (containing 46% "Methoxone" acid) and (3) 2,4-D (containing 96% sodium salt) were applied as pre-emergence dressings with the aim of replacing cultivation in root crops by chemical methods of weed control. The compounds were mixed with 2 cwt. of fine china clay at the rate of 2½ and 5 lb./acre [(1) and 1-2 lb./acre [(2) and (3)] and applications were made at different intervals of 0-8 weeks prior to sowing. The main experiments were carried out on kale and mangolds, but lettuce, onions, field beans, peas, lucerne, sugar beet and swedes were also included. Treatment (1) gave good control of grasses and *Polygonum* spp., while (2) and (3), which were similar in effect, prevented the

emergence of a range of weed species. Mixtures of (1) and (2) or (1) and (3) were more effective against chickweed and *Galium aparine* and had a wider range than each compound applied alone. The minimum safe period between application and seed sowing for most of the above crops at the doses stated was 3-4 weeks. In general, the weedkillers were more effective when applied prior to the emergence of the weed seedlings and when there was the least possible subsequent disturbance of the surface soil. The results point to new possibilities of weed control in crops where at present few chemical methods are available.—I.C.I., Jealott's Hill Res. Stat.

1580. LACHMAN, W. H.

Weeding corn with chemicals.*Proc. Amer. Soc. hort. Sci.*, 1949, 54: 417-28, bibl. 40, illus., being *Contr. Mass. agric. Exp. Stat.* 704.

Following a review of the literature the author summarizes the results of 4 years' work at Amherst, Massachusetts, as follows: "Several herbicides have been found that control weeds in fields of sweet corn for from 2 to 8 weeks. 2,4-D, post emergence, and di-nitro selective herbicides such as Sinox and Dow Selective are effective in killing broad-leaved weeds but do not affect grasses to any extent. Pre-emergence applications of 2,4-D and Dow Contact or Dow General Weedkillers controlled both broad-leaved and grassy weeds. Delaying the 2,4-D application for 6 days after planting was especially beneficial in regard to better control of weeds. The malformations associated with post emergence 2,4-D applications were much less severe when the material was applied in pre-emergence applications. On a cost basis, 2,4-D was the cheapest material to use. However, certain weather conditions occurring soon after application of 2,4-D may be hazardous, particularly on the lighter types of soils. Results with di-nitros look very promising, but more extensive trials are necessary to determine possible hazards with these materials."

1581. LACHMAN, W. H.

Weed control in onions grown from sets.*Proc. Amer. Soc. hort. Sci.*, 1949, 54: 429-34, bibl. 17, being *Contr. Mass. agric. Exp. Stat.* 692.

Trials in 1947 and 1948 at Amherst, Mass., are described with several herbicides used on Ebenezer onions. Eighty gallons per acre of a 2% solution of potassium cyanate (KOCN) was particularly effective against small annual weeds, 3 to 4 applications making hand weeding unnecessary; it must, however, be used as a side spray, direct foliage spraying of the onions being avoided. Additional control was obtained from a pre-emergence application of 75 to 150 lb. of cyanamide dust.

Weed control in fruit crops.

1582. DAVIDSON, J. H.

Chemical weed control in fruit plantings.*Down to Earth*, 1949, 5: 3: 8-9, illus.

Experience in the U.S.A. with various formulations of 2,4-D and 2,4,5-T is described. The latter, in particular, has controlled poison ivy, horse nettle, sumac and

willows. The former, in non-ester forms, has been used successfully against annual weeds in strawberries, raspberries, grapes and blueberries. Great care should, however, be taken in the use of these substances and in the timing of applications, and with top fruits all contact with the foliage should be avoided. The use of TCA for grass control is suggested only for trials; so far only apples and peaches appear to tolerate quantities of TCA sufficient to kill quack grass.

1583. CARLSON, R. F., AND MOULTON, J. E.
Chickweed control in strawberries with IPC.
Proc. Amer. Soc. hort. Sci., 1949, 54:
200-4, bibl. 6, illus., being *J. Art. Mich. agric. Exp. Stat.* 1110.

Robinson and Premier strawberries growing on two Michigan soils and infested with chickweed were dusted at three different times in the autumn of 1948 with IPC (Isopropyl N-phenylcarbamate) at 5, 10, 15 and 25 lb. per acre. All treatments gave satisfactory control of chickweed. Yields of fruit were similar to those of hand-weeded rows, but some injury to the plants occurred at the highest rate. The three lower rates appeared to promote more vigorous root growth in the strawberries, but the highest rate caused some root injury.

1584. ANON.
Effets toxiques du 2-4-D sur arbres fruitiers.
(Toxic effects of 2,4-D on fruit trees.)
Arbres et Fruits, 1949, No. 44/45, pp. 34-9, illus.

Damage to fruit plants in different parts of France has resulted from applying the herbicide 2,4-D, either as a dust or spray, during moderately windy weather, and in one area to its accidental inclusion in a copper spray. The injuries caused to flowers and foliage are described with the aid of photographs. Vines are particularly sensitive, pears are sensitive to 0.01% 2,4-D and apples to between 0.01 and 0.02%, but varieties differ in susceptibility.

Weed control in ornamentals.

1585. WESTER, H. V.
Comparative studies of ammonium sulfamate, borax, and 2,4-D for control of poison ivy and honeysuckle in the National Capital Parks, Washington, D.C.
Proc. Amer. Soc. hort. Sci., 1949, 54: 513-22, bibl. 9.

In trials over 3 years poison ivy was effectively controlled by ammonium sulphamate, wet or dry, borax and 2,4-D under some conditions but not under others. Honeysuckle was controlled by borax and 2,4-D under some conditions but not others. Rates used per square rod were: Ammonium sulphamate, dry 1½ lb. in 8½ lb. sand, wet 1½ lb. in 3 gal. water; borax, 10 lb.; 2,4-D, 3 gal. of 0.1 to 0.4% solutions. At these concentrations dry treatment with ammonium sulphamate caused relatively little or no injury to young trees, but the other treatments were usually very injurious.

1586. MINSHALL, W. H.
Eradication of poison ivy (*Rhus radicans* L.).
IV. Experiments with ammonium sulfamate and sodium chlorate.
Sci. Agric., 1949, 29: 584-94, bibl. 16, being *Contr. Div. Bot. Pl. Path. Dep. Agric. Canada* 990.

The use of ammonium sulphamate was more effective in this experiment than that of sodium chlorate, especially in June or early July. Follow-up treatments two or more years later were required for complete eradication [see also *H.A.*, 17: 718 and 719; *H.A.*, 18: 1819].

1587. VAUGHN, J. R., AND HAMNER, C. L.
The present status of cycloheximide (actidione) as a fungicide.*
Proc. Amer. Soc. hort. Sci., 1949, 54:
435-7, bibl. 4, being *J. No. Mich. agric. Exp. Stat.* 1111.

Laboratory assays and preliminary trials with cycloheximide—a chemical produced by the growth of *Streptomyces griseus*—as a fungicide against powdery mildew of roses, post-harvest brown rot of peaches and turf diseases suggest that it is worthy of extensive trials against various crop diseases. The material is phytotoxic in some cases and this aspect also requires thorough investigation.

Weed control in tropical crops.

1588. PHILLIPS, R. P., AND CHILTON, S. J. P.
Studies on Johnson grass seed populations in the sugarcane areas of Louisiana.
Sugar J., 1949, 12: 1: 3-5, 13-14, bibl. 3.

An expansion of the article abstracted in *H.A.*, 20: 238. Studies show that control must aim at preventing the addition of new seed until those already present are already exhausted; so far it is known that seed will remain viable in the soil for 30 months. This can be achieved in large measure by fallow ploughing and by maintaining the succeeding plant cane crop free of Johnson grass. Too many ratoon crops should be avoided, as they allow seed populations to build up.

1589. BEALE, F. A.
The development and use of a system for controlling weeds on Puerto Rico's south coast.
Sugar J., 1949, 12: 3: 16-17, 32.

The routine followed for plant canes may be summarized as one general pre-emergence spray of the ammonium salt of 2,4-D after the cane has been planted and irrigated, followed by two contact sprays using knapsacks and two cultivator weeding. With ratoons, after the trash has been lined and an irrigation given, the banks are raised by means of discs mounted on the cultivator tool bar. When the banks have been loosened a spraying programme similar to that used for plant canes is adopted, though usually with one fewer contact spraying. A second raising of the banks, necessary for irrigation, also helps to control weeds.

1590. HANCE, F. E.
Weed control on Hawaiian sugar cane lands—developments in use of 2,4-D.
Hawaii. Plant. Rec., 1949, 53: 93-105, bibl. 2.

Directions are given for preparing a number of 2,4-D formulations for use as pre-emergence and contact herbicides in sugar cane fields and against trees.

* N.B.—This abstract should be in the Plant Protection Section under Antibiotics.

These include a highly concentrated oil solution for use in helicopters. Several amine forms have proved fairly satisfactory substitutes for the esters, which are dangerous to cane setts on some soils and to neighbouring crops, trees, etc., through air-borne traces.

1591. JAGOE, R. B., AND JOHNSTON, M.

The use of plant growth-regulating substances as weed killers.

Malay. agric. J., 1949, 32: 304-14, bibl. 11.

Following a general account of the use of plant growth substances as herbicides the authors outline trials made in Malaya and summarize the results obtained as follows: "1. 2,4-D compounds and MCPA have been successful for control of broad-leaved weeds in rice fields and water courses in Malaya. Water-hyacinth is easily and economically destroyed. 2. Most sedges have been partially controlled but not readily killed, but grass weeds of padi-fields and water courses have not been affected. 3. Old established weeds have proved difficult to eradicate and up to four times the usual recommended dosages may be required. 4. *Mimosa pudica* has shown resistance to treatment with 2,4-D, but control has been obtained in pasture using MCPA. 5. *Cyperus rotundus* has been found to be very resistant, but trials are continuing. 6. Soil treatments, especially with water soluble compounds, have proved successful in keeping bare ground weed free for short periods."

1592. ZIMMERMAN, P. W., AND OTHERS.

Practical control of water hyacinth with 2,4-D.

Agric. Chemls., 1950, 5: 45-9, 81.

The rapid spread of water hyacinth in the water ways of the southern United States has been an alarming problem for many years. A research team has been set up to work out control measures, and the experimental results so far obtained are summarized in this report. One of the more important findings is that the weed is most susceptible to the action of 2,4-D during the relatively slow growing period from August to March, when killing and sinking was achieved within 30 days from the date of treatment. With a new type of off-centre spray nozzle, the "Boomjet", effective control was accomplished with 8 lb. or 2 gal. of 40%

2,4-D concentrate in 75 gal. of water applied to one acre of hyacinths when the speed of travel was 3 miles per hour. Preliminary tests with a helicopter suggest that the most effective way of clearing hyacinth-clogged water ways is to apply the spray from above tree top level.

1593. TORREY, J. G., AND THIMANN, K. V.

Application of herbicides to cut stumps of a woody tropical weed.

Bot. Gaz., 1949, 111: 184-92, bibl. 17, illus.

The effectiveness of several herbicides when applied to the cut stumps of the woody, tropical weed, marabú (*Dichrostachys nutans*), was determined. A 20% aqueous emulsion of the butyl ester of 2,4-D, applied twice, was the most effective of the preparations tried in repressing new shoot growth. Experiments were also carried out to throw some light on the entry and transport of the herbicide and the response of the plant. There is no evidence that 2,4-D enters into the roots of marabú, and it is suggested that repeated defoliation, either by 2,4-D or by topping, may be necessary to kill the underground portions of the plants.—Atkins Garden and Research Laboratory, Soledad, Cuba.

Noted.

1594.

a FRAZIER, J. C.

Principal noxious perennial weeds of Kansas, with emphasis upon their root systems in relation to control.

Bull. Kans. agric. Exp. Stat. 331, 1948, pp. 45, bibl. 23, illus.

b KELLY, S., AND AVERY, G. S., Jr.

The effect of 2,4-dichlorophenoxyacetic acid and dinitro compounds on the respiration of peas.

Abstr. in *Amer. J. Bot.*, 1949, 36: 826.

c SIMMONDS, F. J.

Initial success of attempts at the biological control of the weed *Cordia macrostachya* (Jacq.) R. and S. in Mauritius.

Trop. Agriculture Trin., 1949, 26: 135-6, bibl. 6.

VEGETABLES AND MISCELLANEOUS TEMPERATE CROPS.

Vegetables, general.

(See also 1202, 1203, 1210, 1234, 1241, 1266, 1267, 1271-1273, 2139, 2140, 2142, 2145, 2153, 2155, 2156.)

1595. HIRST, F.

Vegetable varieties for canning.

Grower, 1950, 33: 724-7.

The English varieties preferred for canning are described briefly of the following: Peas, runner beans, broad beans, carrots, turnips, beetroot, spinach and celery. Peas for drying are also mentioned.

1596. ALLEN, E. F.

Vegetable variety trials at Cameron Highlands in 1948.

Malay. agric. J., 1950, 33: 5-22.

Results are given for a series of experiments with 20 types of vegetables at Cameron Highlands (3,000-5,000 ft.), in Malaya, from which it is concluded that the following could usefully be introduced for commercial cultivation: Cucumber (Burpee's Hybrid), French bean (Tender green and Dwarf stringless green pod), beet (Lutz green leaf), sweet corn (Stowell's evergreen hybrid), lettuce (Big white Boston), Chinese cabbage (Pe-tsai), early cabbage (Early Jersey Wakefield and Glory of Enkhuizen), celery (Golden self-blanching), sweet pepper (Merrimack wonder and Early pimento), cauliflower (Burpeeana), squash (English vegetable marrow White bush). With the following vegetables, established varieties outyielded new ones: carrots (Manchester table), turnips (Yate's champion purple top), sugar pea (local), green peas (Earlicrop).

1597. MINISTRY OF AGRICULTURE, LONDON.

Salad crops under glass.

Bull. Minist. Agric. Lond. **143**, 1949, pp. 23, plates 13, 1s.

The gap left in the Ministry's publications on salad production has at last been filled. This new bulletin dealing with the production of salad crops in glass-houses completes the series begun with Bulletin 55, "Outdoor salad crops", and continued with Bulletin 65, "Crop production in frames and cloches". Concise information is given on the production of lettuce in heated houses and Dutch light structures, mustard and cress on a large and small scale, radish, mint and cucumbers. Useful notes on marketing are included. Control of pests and diseases is dealt with very erratically, either being ignored, touched on in passing, or, as in the case of the cucumber mite (*Tyroglyphus putrescentiae*), given detailed attention. In some cases the reader is referred to other Ministry publications on the subject.

1598. LANDOVSKÝ, F.

Zelenina československé původní odrůdy.
(Vegetable varieties of Czechoslovak origin.)
Sbírka příruček Rádce zemědělce **79**, 1948, pp. 63, illus. [received 1950].

An illustration accompanies almost every one of the 45 varieties described in this booklet.

1599. PUREWAL, S. S.

Vegetable seed production in the Kulu valley.
Indian Fmg., 1949, **10**: 293-7.

Methods evolved at Katrain, Kulu valley, for raising seed crops of cabbage, turnip, kohlrabi, carrot, beetroot and French beans are described.

1600. HORNE, F. R.

The production of pure seed stocks of improved varieties.

J. roy. agric. Soc., 1949, **110**: 39-50, bibl. 8.

A general account of the methods and problems involved in the breeding, selection and testing of new varieties and the maintenance of pure stocks of approved varieties, including the maintenance of healthy stocks of seed potatoes.

1601. MCCALLAN, S. E. A.

Some chromate complexes and organic compounds as seed protectants.

Contr. Boyce Thompson Inst., 1950, **16**: 5-20, bibl. 8.

From a series of 640 chromate or organic compounds tested in the greenhouse on peas and other seeds as to their value for seed treatment, the following 4 were selected as promising: mercury-zinc-chromate complex, copper-zinc-chromate complex, cupric γ -chloroacetoacetanilide and the reaction product of dimethyldithiocarbamate and sulphur dichloride. These experimental compounds were tested under field conditions on pea, spinach, beet, lima bean, cucurbit, cabbage, snap bean and tomato at 7 different stations in various parts of the United States. All 4 compounds were effective on the majority of seeds tested, the reaction product of dimethyldithiocarbamate and sulphur dichloride giving the best all-round performance.

1602. GUSTAFSON, F. G.

Influence of temperature on the vitamin content of green plants.

Plant Physiol., 1950, **25**: 150-7, bibl. 11.

This investigation has dealt with determinations of thiamin, riboflavin and niacin (nicotinic acid) in the vegetative parts of a number of plants subjected to temperatures of 10-15° and 28-30° C. It has been found that all three vitamins are more abundant in tomato, bean and soybean at a temperature of 28-30° C. than at 10-15° C. Broccoli, cabbage and spinach, on the other hand, are richer in these vitamins at the lower temperature. In clover, peas and wheat, the thiamin content was higher at 28-30° C., though riboflavin and niacin were more abundant at the lower temperature. [From author's summary.]—University of Michigan, Ann Arbor.

1603. ALLEN, E. F., AND KING, T. A.

Manurial experiments on vegetables at Cameron Highlands.

Malay. agric. J., 1950, **33**: 23-6.

Three garden fertilizers containing approximately 7% N, 12.5% P₂O₅, 3% K₂O and 35% organic matter at 2 tons per acre gave similar yields at lower cost with cabbage, French beans and carrots than did prawn dust at 5½ tons per acre.

1604. V. HÖSSLIN, R., AND PENNINGSFELD, F.

Salzkonzentrationsschäden in einem Gefäßversuch in ihrer Abhängigkeit von Düngung und Bodenart. (Pot trials showing the influence of fertilizer and soil type on plant injury from high salt concentrations.)

Z. PflErnähr. Düng., 1949, **47**: 145-61, bibl. 11.

Enamelled pots of 13 litre capacity were used in trials designed to determine the salt concentration at which vegetable plants are injured. In order to obtain comparable results for different types of soil with a different water holding capacity the suction force of the soil was taken into account in addition to the actual salt content. Of the vegetables tested in a preliminary study carrots and lettuce proved most susceptible, but *Digitalis purpurea* was also highly sensitive, while the micro-organisms of the soil remained unaffected. N fertilizers were found to increase salt concentration and plant injury more than P and K. Plants growing in soils with a high water holding capacity were shown to tolerate relatively high salt concentrations. The beneficial effect of organic manure on plant injury from salt is thus accounted for by an improvement in the water holding capacity of the soil.—Horticultural Inst., Weißenstephan.

1605. PLANT, W.

A survey of mineral deficiencies in crops on arable land in two English counties.

Emp. J. exp. Agric., 1950, **18**: 41-8, bibl. 6.

In a survey covering Hereford and Somerset the nutrient conditions of agricultural crops with respect to N, P, K, Ca, Mn, and B, were diagnosed by visual methods and by tissue tests except for Mn and B. Deficiencies of N and P were widespread, K deficiency occurred only in potatoes and beans, and micronutrient deficiencies in sugar-beet. Acidity (without differentiating between Ca deficiency and Mn toxicity) was observed only in roots, including brassicas.—Long Ashton Research Station.

1606. WARING, E. J.

Sawdust as a soil improver causes nitrogen deficiency in vegetable crops.

Agric. Gaz. N.S.W., 1950, **61**: 73-6, bibl. 4.

Incorporation of sawdust and similar organic matter of low nitrogen content in soils, especially for vegetable crops, cannot be recommended, for it may cause reduced yields as a result of the nitrogen deficiency so created. This reduction in yield persists for at least two years, although it can be counteracted by the application of sulphate of ammonia or nitrate of soda, but not appreciably by lime.

1607. BAUER, A. H., HONEY, E. E., AND NICHOLS, L. P.

How to grow disease-free vegetable plants.

Leaf. Pa St. Coll. Sch. Agric. **132**, 1950, pp. 4.

After a brief introduction on the general treatment of seed, soil, and seedlings, directions are given on how to grow disease-free plants of tomato, cabbage and related species, celery and celeriac, eggplant, and pepper, followed by general information on applying the treatments.

1608. BOSCH, E.

Die Schwarzbeinigkeit unserer Kulturpflanzen. (Black leg on crops in Switzerland.)

Gärtnermeister, 1950, **53**: 65-7, illus.

During trials at the Wädenswil research station and at the R. Maag A.G. establishment in Switzerland, the best control of this complex of diseases was achieved with organic fungicides based on hydroxyquinoline, benzoquinone and thiocarbamate, but there is a danger of depressing the growth of seedlings grown in the treated soil. A new and harmless chemical promising good control is now on trial.

1609. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

The leaf-eating ladybird (*Epilachna 28-punctata*).

Agric. Gaz. N.S.W., 1949, **60**: 653-4.

This ladybird feeds chiefly on the foliage of *Solanum* spp., but it also attacks melons, pumpkins, and related plants. Control measures recommended for potatoes and tomatoes are 2% DDT dust or a spray consisting of DDT emulsion (20%) 4 fluid oz. to 5 gal. water, or dispersible DDT powder 1½ oz. to 5 gal. Pumpkins and melons are subject to injury from DDT, particularly in the dust form, but light spraying with DDT at a concentration of 2 fluid oz. of emulsion (20%) to 5 gal. of water may be given without seriously affecting the growth of the plants. Where available, pyrethrum powder one part, mixed with 4 parts by weight of kaolin or flour, or calcium arsenate, one part, mixed with 15 parts of hydrated lime, may be dusted on to the plants.

1610. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

Leaf-eating ladybird (*Epilachna 28-punctata*).

Agric. Gaz. N.S.W., 1950, **61**: 146.

The leaf-eating or 28-spotted ladybird has recently been numerous and destructive on potatoes, cucumbers, marrows and rockmelons in coastal areas of New South Wales. Tomatoes and orange trees have also

been attacked. In experiments DDT sprays and dusts readily destroyed adults and larvae.

1611. KING, K. M., ARNASON, A. P., AND MANSON, G. F.

Wireworms.

Processed Publ. Ser., Ent., Dep. Agric., Ottawa **87**, 1948, pp. 8.

The crops mentioned as being attacked by wireworm include cereals, beans, potatoes, onions, gladiolus, and transplants of tobacco, tomato, cabbage, and lettuce. Most crops and ornamentals may be damaged when infestations are severe. Control is effected by liquid soil fumigants, other soil insecticides, and seed treatments. Ethylene dibromide, when correctly used, has proved highly effective. Soil treatments with benzene hexachloride, chlordan, DDT and D-D mixture have given very promising results for many crops, but should be used with caution.

1612. MILLER, P. R., AND O'BRIEN, M. J.

Fungicide trials during 1949.

Agric. Chemls, 1950, **5**: 28-31, 73.

Maps illustrate the distribution of the following diseases in the United States in 1949 and tables indicate the effect of the different fungicidal treatments applied: Late blight of potato and tomato (*Phytophthora infestans*), blue mould of tobacco (*Peronospora tabacina*) and downy mildew of cucurbits (*Pseudoperonospora cubensis*). The second year's observations under the warning service show that participants benefited particularly in the control of tomato blight and cucurbit downy mildew.

1613. STITT, L. L., AND EVANSON, J.

Phytotoxicity and off-quality of vegetables grown in soil treated with insecticides.

J. econ. Ent., 1949, **42**: 614-17, bibl. 7.

The effects of soil treatments with 2 formulations of benzene hexachloride, parathion, and chlordan were determined on the stand, yield and flavour of 9 vegetables.

1614. HOLMES, E.

Successful BHC insecticides.

Fmg, Norwich, 1949, **3**: 374-8, illus.

In a general account of benzene hexachloride, its history and uses, mention is made of the danger of tainting potatoes and possibly carrots, beetroot and onions, if these are planted within 2 years of the heavy dressing of BHC needed to control wireworms. At normal rates used in flea beetle dusts there is no risk of this happening to brassicas. Black currants and peas in pod are, however, susceptible to taint. Its uses in glasshouses are also noted.

1615. HEY, G. L.

Parathion smoke generators.

Grower, 1950, **33**: 519-23, bibl. 3.

The use, with precautions to be taken, is described of parathion and azobenzene smokes, used separately or in the same canister, to control various glasshouse pests, notably red spider, mushroom fly and springtails. The combined smokes are not very effective against various caterpillars on tomatoes, chrysanthemums, carnations, etc., and their use is not advised for gerberas, schizanthus and some rose varieties.

1616. HALLEMANS, A.

Practische grondontsmetting tegen wortelaaltjes in de groenteteelt met zwavelkoolstofemulsie. (A practical method of soil disinfection against root-knot eelworm of vegetables with carbon disulphide emulsion.)

Cult. Hand., 1950, 16: 175-6.

The author describes the use of carbon disulphide emulsion for controlling the root-knot nematode [*Heterodera marioni*] in the soil of greenhouse seedbeds for vegetables, e.g. celery, tomato, cucumber and melon. The emulsion diluted (1 in 20) with water can be applied to the soil with a watering-can at the rate of 10 litres per sq. metre.

Vegetables, particular.

(See also 1214, 1215, 1233, 1245.)

1617. MINISTRY OF AGRICULTURE, LONDON.

Asparagus.

Bull. Minist. Agric. Lond. 60, 3rd edition, 1949, pp. 34, plates 29, 1s. 6d.

Considerable changes have been made in this bulletin since the last edition in 1939 [see *H.A.*, 10: 423]. These have mainly become necessary as a result of the increased use of machinery for the cultivation of asparagus on a field scale. The methods and implements used are fully described in the appendix, under "Local Practices", and are well illustrated by photographs. This appendix includes an interesting account of the pioneer work in the production of asparagus on a highly mechanized system, carried out in Kent. In other respects the bulletin has been considerably condensed. The section on cultivation of asparagus abroad has been omitted, but frequent reference is still made throughout the text to foreign practices of interest. The omission of the three pages devoted to the production of giant asparagus is a pleasing sign of the times.

1618. D.

De teelt van asperges. Selectie van eenjarige mannelijke planten. (Asparagus growing. Selecting male plants.)

Cult. Hand., 1950, 16: 172-3.

A method is described for selecting male asparagus plants. Differences in vigour can be detected when seedlings are a few weeks old but can be made more evident by pinching back the young plants to about 1 cm. above soil level. After such treatment most of the plants send up one new shoot, a few plants develop 2, and very few 3 new shoots. The plants producing 2 or 3 shoots are the most vigorous and are selected for further observation. In a trial such selected plants came into flower before the rest and proved to be males.

1619. ARMAND, J. E.

Asparagus beetles.

Processed Publ. Ser., Ent., Dep. Agric. Ottawa 103, 1949, pp. 3.

The asparagus beetle *Crioceris asparagi* and the spotted asparagus beetle, *C. duodecimpunctata* and their life-cycles are outlined. For their control, in addition to hygienic measures, the recommendations are: (1) During the cutting season: placing pulverized

cyanamide along the rows at the rate of 300 lb. per acre, and applying sprays or dusts containing rotenone, (2) After cutting season and for seedling beds at any time: dusting or spraying with lead arsenate.

1620. MICHELBACHER, A. E., AND BACON, O. G.

Thrips on asparagus.

J. econ. Ent., 1949, 42: 849-50.

As chemical control of the thrips does not appear practical, asparagus fields should be kept free of weeds, and if a serious infestation is suspected the spears should be harvested while the heads are still tight.

1621. RAUTERBERG, E.

Einfluss steigender Stickstoff-, Phosphorsäure- und Kaligaben auf die Entwicklung und den Ertrag von Bohnen (*Phaseolus vulgaris*) und die Bedeutung des Nährstoffverhältnisses. (The effect of increased applications of nitrogen, phosphoric acid and potassium on development and yield of beans, with special reference to the ratio of the nutrients.)

Z. PflErnähr. Düng., 1949, 47: 167-79, bibl. 1.

With beans grown in sand culture the NPK ratio of 4: 1: 1 was found to give optimum results, i.e. highest total yields with the lowest proportion of pod weight. A ratio of 2: 1: 1 depressed total yields and raised the proportion of pod weight from 38.9% to 48.7%. Where the ratio was unfavourable, larger or smaller brown spots appeared on the leaves, while plants fertilized suitably did not show any such symptoms. Dried blood proved a satisfactory source of nitrogen.—Berlin University.

1622. WADLEIGH, C. H., AND BOWER, C. A.

The influence of calcium ion activity in water cultures on the intake of cations by bean plants.

Plant Physiol., 1950, 25: 1-12, bibl. 16.

Red kidney bean plants were grown in aerated water cultures varying as to calcium supply in the presence and absence of added NaCl. Accumulation of cations in the various parts of the plant was ascertained. This was compared with similar data from bean plants grown on substrates with nutrients supplied on ion exchange resins, with exchangeable sodium percentage being the primary variant but with exchangeable Ca and Mg percentage varying reciprocally. The operation of the complementary ion effect on the adsorptive surface induced a marked deviation from the response in water cultures particularly with reference to trends in accumulation of potassium. [Authors' summary.]—U.S. Regional Salinity and Rubidoux Laboratories, Riverside, California.

1623. YARWOOD, C. E.

Effect of temperature on the fungicidal action of sulphur.

Phytopathology, 1950, 40: 173-80, bibl. 17.

The temperature coefficient for the fungicidal action of sulphur, in tests with bean powdery mildew (*Erysiphe polygoni*) and bean rust (*Uromyces phaseoli*), is compared with other temperature coefficients previously described.

1624. SPEYER, W.
Vorschläge zur Bekämpfung des Pferdebohnenkäfers (*Bruchus rufimanus*). (Suggestions for control of bean beetle in broad beans.)
NachrBl. dtsh. PflSchDienst, 1950, 2: 1-2, bibl. 4.
While it is comparatively easy to destroy the bean beetle in beans in storage a large percentage of beetles overwinter in unharvested beans. These are usually the most heavily infested seeds dropped from the oldest pods before harvest. One control measure suggested is breeding beans with indehiscent pods. [See also *H.A.*, 19: 3103.]—Inst. vegetable and oil seed pests, Kiel-Kitzeberg.
1625. ANON.
California bean growers try wireworm control.
Canad. Gr., 1949, 72: 11: 12.
Good control of wireworms was achieved by bean growers in Sacramento Valley, California, with Isotox insecticides [containing pure γ -isomer of hexachlorocyclohexane]. The treatments were $\frac{1}{2}$ to $\frac{3}{4}$ lb. of γ -isomer per acre using Isotox dust or spray on soil; or 4 oz. of Isotox wettable per 100 lb. of seed beans.
1626. WADE, G. C.
Diseases of broad beans and tick beans.
Tasm. J. Agric., 1950, 21: 28-32, bibl. 1, illus.
The diseases mentioned are ascochyta leaf spot (*Ascochyta pisi* var. *fabae*), rust (*Uromyces fabae*), and mosaic. The symptoms and control measures are described. The ascochyta leaf spot is the most serious of these diseases; in many cases the damage caused has been very severe and has resulted in the complete failure of seed crops and of crops grown for fresh beans. It frequently reduces the growth of tick bean cover crops in orchards, and at times has caused almost complete destruction of the crop.
1627. ANON.
Rust of French beans: occurrence of a new strain on dwarf varieties.
Agric. Gaz. N.S.W., 1949, 60: 646-7.
A severe infection of Tweed Wonder dwarf bean in the Gosford-Wyong district of New South Wales suggested that a new strain of rust (*Uromyces phaseoli*) different from that previously found on Epicure and Kentucky Wonder was involved. This was confirmed by tests carried out by Professor W. L. Waterhouse at the University of Sydney. The application of sulphur dust or spraying with wettable sulphur is recommended.
1628. WESTER, R. E., AND WEIGEL, C. A.
Effect of DDT and wetting agent on plant growth of Triumph and Peerless varieties of bush lima beans.
Proc. Amer. Soc. hort. Sci., 1949, 54: 373-7, bibl. 1, illus.
In a trial at Beltsville, Maryland, DDT applied as a spray or dust, with and without rotenone, injured and stunted the variety Triumph but not Peerless. A wetting agent used alone caused no injury, but, added to DDT, appeared to intensify the injury under some conditions.
1629. FRAZIER, W. A., AND HENDRIX, J. W.
Hawaiian Wonder, new rust-resistant pole green bean.
Circ. Hawaii agric. Exp. Stat. 28, 1949, pp. 7, illus.
Hawaiian Wonder is a new flat-podded pole green bean developed specially for resistance to rust in Hawaii. Its parentage, characters, and adaptability are described.
1630. ELMORE, J. C.
A device for spraying bean seed in the row while planting.
Publ. U.S. Dep. Agric., agric. Res. Administ. Bur. Ent. Pl. Quar. ET-279, 1950, pp. 3, illus.
A simple attachment to a seed drill, developed for spraying lima bean seed and adjacent soil just before the seed is covered, is described and illustrated. It consists of a pipe and nozzle clamped to, and set immediately behind, the coulter.
1631. SREENIVASAN, A., AND WANDREKAR, S. D.
Biosynthesis of vitamin C in germinating legumes.
Nature, 1950, 165: 765-6, bibl. 8.
In germinating mung beans, *Phaseolus radiatus*, there was a rapid and progressive decrease in the proportion of ascorbic to dehydro-ascorbic acid, paralleled by corresponding increases in ascorbic acid oxidase activity. Effects of germination in the absence of light and of cold treatment are noted, among which were enhanced vitamin C formation, increases in glutathione and decreases in dehydro-ascorbic acid and in oxidase activity.
1632. ZAUMEYER, W. J.
Top cropper in snap beans.
Seed World, 1950, 66: 3: 8, 62-3, illus.
Topcrop, a new and highly recommended snap bean, is available to growers for the first time this year. It was bred by the Bureau of Plant Industry, Soils and Agricultural Engineering, U.S.D.A., from U.S. No. 5 Refugee and Full Measure. It is resistant to common mosaic, pod mottle, and the New York 15 mosaic, a relatively new disease important in the western United States. Principally as a result of its resistance to these virus diseases, it has consistently outyielded many of the standard varieties. Topcrop closely resembles Rival, but matures about a week earlier. It makes vigorous growth even under adverse weather conditions, and the pods are of excellent quality for market, canning and freezing.
1633. ANDRUS, C. F., AND HOFFMAN, J. C.
Fullgreen, a blight resistant bush snap bean.
Seed World, 1950, 66: 9: 16, 18.
This new American variety, very suitable for canning and freezing, is relatively resistant to common blight (*Xanthomonas phaseoli*), halo blight (*Pseudomonas medicaginis* var. *phaseolicola*), powdery mildew (*Erysiphe polygoni*), bean virus 1, and some forms of anthracnose and rust. It is, however, fully susceptible to the *fusca* form of bacterial blight.
1634. CAMPBELL, J. A., AND HOFFMAN, J. C.
Contender, a new fresh-market snap bean.
Seed World, 1950, 66: 2: 14-15, 46, illus.

This new variety, resistant to common bean mosaic and somewhat resistant to powdery mildew, is introduced by the Bureau of Plant Industry, Soils and Agricultural Engineering, U.S.D.A. The pods are similar to those of Stringless Black Valentine, but Contender is about 5 days earlier and yields considerably more heavily.

1635. COHN, A. E., AND DEZEEUW, D. J.
Response of certain varieties of snap bean (*Phaseolus vulgaris*) to seed treatments.
Quart. Bull. Mich. agric. Exp. Stat., 1950, 32: 386-401, bibl. 16.

Variation in germination was observed in the 10 varieties of snap bean treated with chemicals against damping-off in 1948 on the Michigan State College Farm. Of the 5 seed protectants tested, Spergon (tetrachloroparabenzquinone 98%) applied at 4 oz./100 lb. caused the most significant increase in germination, L224 (zinc mercury chromate) at 4 oz./100 lb. followed closely, and Arasan (tetramethylthiuramdisulphide 50%) at 2 oz./100 lb. was third in effectiveness.

1636. SAYRE, C. B.
Sodium increases the yield and value of red beets.
Sodium in Agriculture,* reprints from *Farm for Victory and Victory Farm Forum*, 1943-49, pp. 20-1.

An increase in the rate of seeding from 9.8 to 15.6 lb. per acre did not affect total yield but increased the proportion of small-sized beets and thereby profits. The experiments further showed that table beets require sodium for maximum yields and for improved flavour and colour of foliage [tops used as greens]. Nitrate of soda was found to be the best form to use, the fertilizer being applied at the rate of 750 lb./acre, half of it before planting and the rest 6 weeks later.—N. York St. agric. Exp. Stat.

1637. PLANT, W.
The control of whiptail in broccoli and cauliflower.
Agriculture, Lond., 1950, 57: 130-4, bibl. 5, illus.

Whiptail due to molybdenum deficiency has been found on a wide range of soil types in Britain within a pH range 4.5-6.5. Dry matter of leaves of affected plants contain 0.02-0.08 p.p.m. molybdenum compared with 0.10 to 3.0 p.p.m. in healthy plants. Results of two experiments are given which show that whiptail can be corrected either by applying sodium or ammonium molybdate at 2 to 4 lb. per acre, or by liming, which appears to increase the availability of soil molybdenum and to reduce manganese toxicity sometimes associated with it. Where whiptail occurs after it is too late to carry out liming, control can be obtained by spraying early with sodium molybdate at $\frac{1}{2}$ lb. per 100 gal. plus a wetter. Watering seedbeds with a solution of sodium molybdate may prove an insurance against the disease on acid soils.—Long Ashton Res. Stat.

1638. PLANT, W.
Use of lime and sodium molybdate for the control of "whiptail" in broccoli.
Nature, 1950, 165: 533-4, bibl. 4.

* Published by Chilean Nitrate Educ. Bur. Inc., N. York.

Data are presented on the effect of different treatments on the percentage of marketable heads, rejects and whiptail in two trials in Cornwall. Sodium molybdate applied at the rate of 2 and 4 lb. per acre reduced whiptail incidence from 30-40% on controls to 0-8%. Ground limestone at 2 lb. per acre gave similar results. A second set of data records the increase in molybdenum content from 0.08 p.p.m. (dry matter) in the leaves of control plants to 0.32-0.39 p.p.m. in the leaves of plots treated with sodium molybdate and ground limestone, with a corresponding reduction in manganese content. These results, supported by numerous observations, show that liming will cure whiptail on acid soils by making molybdenum available, while on neutral soils sodium molybdate should be added [see also previous abstract].

1639. WARING, E. J.
Molybdenum deficiency in cruciferous crops: cause of young-leaf edge-burn, leaf mottle and reduced returns.
Agric. Gaz. N.S.W., 1950, 61: 15-17, bibl. 6.

It has been shown that "whiptail" of cauliflowers is controlled by applying sodium or ammonium molybdate to the soil [H.A., 19: 1242]. Further observations at Hawkesbury Agricultural College and elsewhere indicate that cabbage, broccoli, brussels sprouts and turnips may benefit by applications of these substances to molybdenum-deficient or unduly acid soils.

1640. ANON.
The use of ammonium molybdate or sodium molybdate for the control of whiptail of cauliflower.
Agric. Gaz. N.S.W., 1950, 61: 77-80, illus.

It is recommended that each ten square yards of seedbed be watered with 1 oz. of pure ammonium molybdate or 3 oz. of a crude (42%) sodium molybdate dissolved in 10 gal. water.

1641. LAMPITT, L. H., GINSBURG, L., AND BAKER, L. C.
The vitamin C content of English and South African cabbages.
J. Sci. Fd Agric., 1950, 1: 12-14, bibl. 7.

Results of examinations indicate that vitamin C content of the English cabbage is higher than that of the South African cabbage, irrespective of location. In England spring cabbage was found to contain most vitamin C, whereas in South Africa vitamin C content did not show any seasonal variation.

1642. BUHL, C.
Eine Viruskrankheit des Kopfkohls (*Brassica oleracea* L.)? (Vorläufige Mitteilung.) (A new virus disease of cabbage? (Preliminary communication).)
NachrBl. dtsh. PflSchDienst, 1950, 2: 53-4, bibl. 2, illus.

The author describes an unidentified disease occurring since 1945 on white-, red- and savoy-cabbages in Dithmarschen, Germany. Virus origin is not yet established.

1643. HEAN, A. F.
A South African virus disease of crucifers.
Sci. Bull. Dep. Agric. S. Afr. 254, 1947, pp. 15, bibl. 29, illus. [received 1950].
A virus disease affecting cauliflowers, cabbages and

stocks, has been found in the Transvaal. It causes a reduction in the size of plants, with leaf distortion, vein-clearing and banding. The symptoms are described and the experimental host range given. The disease is readily transmitted by two species of aphid, *Myzus persicae* and *Brevicoryne brassicae*.

1644. STOLL, K.

Über die *Alternaria*-Schwärze der Kohlarthen. (*Alternaria* diseases of cabbages and related plants.)

NachrBl. dtsh. PflSchDienst, 1948, 2: 174-8, bibl. 46 [received 1950].

The author is engaged in an investigation of a seed pod necrosis of cauliflower associated with *Alternaria* spp., which has caused heavy losses (up to 95%) in some brassica seed growing areas of Eastern Germany. The results of this work are to be published later. In the present survey 5 *Alternaria* spp. attacking various parts of brassica plants are discussed, viz. *A. brassicae*, *A. circinans*, *A. oleracea*, *A. herculea* and *A. tenuis*. Whether *Alternaria* spp. are a primary cause of seed pod necrosis in the cabbage family remains undetermined.

1645. BUHL, C.

Die sogenannte "Umfallerkrankheit" der Kohlsamenträger (*Brassica oleracea* L.). (Vorläufige Mitteilung.) ("Black rot" of cabbage grown for seed. (Preliminary communication.))

NachrBl. dtsh. PflSchDienst, 1950, 2: 3-5, bibl. 1, illus.

In Dithmarschen, in Germany, since 1940 in up to 80% of plants of the *Brassica oleracea* group set out in the second year for seed production, stems wilted and rotted when the flowers set. Early, medium and late strains were equally affected, but there was some difference in varietal susceptibility, red cabbage being the most resistant. It was found that bacteria were the cause in 84% of the cases. Fungi were seen only rarely and were mainly saprophytic. It is suggested that infection occurs through wounds, at what period was not ascertained, but an incubation period of 15 to 21 days was established. The necessity for the use of clean plants for planting out after winter storage is stressed, and the value of disinfectant dips is being tested.—Inst. vegetable and oil seed pests, Kiel-Kitzeberg.

1646. LIPEKKAJA, A. D.

Trials with "phytoncides" for the control of vascular bacteriosis of cabbage. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 1, pp. 51-2.

Tests with "phytoncides" [see next abstract], toxic principles extracted from certain plants, are described for the control of "vascular bacteriosis" [? black rot (*Xanthomonas campestris*)], which had recently caused a loss of 80% of cabbage plants in the Krasnodar region. The preparations, extracts of onion, garlic, and horseradish root, were used as seed disinfectants and compared with formalin. The best results were obtained with garlic extract.

1647. BURYHINA, E. K.

Cabbage phomosis and its control. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 1, pp. 52-6.

Phomosis, dry-rot or canker (*Phoma lingam*) of cabbage has been known in Russia for 15 years. The symptoms on seedlings and on mature plants are described in detail. Infection of pods and seeds is severe in wet years, but the first-year plants are infected most when there is insufficient moisture, for weak plants are most susceptible. The fungus is a wound parasite, and in laboratory experiments inoculated plants became infected only when infested with the cabbage bug [*Murgantia histrionica*]. In experiments for disinfecting seed good results were obtained with corrosive sublimate (1:1,000 for 30 min.), Granosan (4 g. per kg.), "Zbarskii's bactericide" (1:10,000 for 30 min.), and NIUIF-I (1:300 for 15 min.), but the best results were obtained by treatment with hot water at 50° C. for 20 min. A garlic extract [phytoncide, see above, No. 1646] lessened infection with only slight reduction of germination. Infected seed-bearing plants may disperse wind-carried spores to first-year plants.

1648. MIRONOV, E. V.

The application of tufaceous limestone for the control of club root in cabbage. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 52-4.

Favourable results are recorded from using tufaceous limestone (found in the Moscow and other regions and containing 74% calcium carbonate) instead of slaked lime, for the control of club root of cabbages (*Plasmiodiophora brassicae*). Placing it in the holes at planting gave better results than broadcasting.

1649. KOZLOVA, E. N.

The penetration of organic insecticides into plant tissues. [Russian.]

Doklady Vsesojuz. Akad. sel'sk. Nauk S.S.S.R., 1950, No. 3, pp. 30-2.

Cabbage plants were planted in pots containing soils to which HCH or DDT had been added. After 25 days the plants were infested by hand with the cabbage aphid (*Brevicoryne brassicae*) and larvae of the mustard beetle (*Phaedon cochleariae*). After 3 days the mortality recorded was 62 to 88%. Comparable results were obtained with larvae of the Asiatic locust (*Locusta migratoria*) on wheat plants.

1650. MORGAN, D. T., Jr., AND RAPPLEYE, R. D.

Polyembryony in *Capsicum frutescens*.

Abstr. in Amer. J. Bot., 1949, 36: 800.

A total of 294 twin and triplet seedlings was obtained from 78,005 germinated seeds of *Capsicum frutescens*. All but 3 of the plural embryos were twins. The numerous haploid plants obtained from twin seedlings have been utilized in developing homozygous diploids by colchicine treatment. Some of the doubled haploids appear to be promising commercial types. Striking differences in the frequency of polyembryony for the different varieties were noted.—University of Maryland, College Park.

1651. HAZINA, E. P.

Changes in the inherited characters of the fruit obtained from a vegetative hybrid. [Russian.]

Agrobiologija (Agrobiology), 1949, No. 4, pp. 121-2, illus.

A form of *Capsicum nigrum* with long, dark green, thin-walled pods was grafted on a variety with round, pale, thick-walled fruit. The pods produced on the scion were similar to those of the ungrafted control scion variety, but when the seed was sown it gave rise to plants with three types of fruit, some like those of the scion, some like those of the rootstock variety and others intermediate. In the F_2 generation there was further segregation and among the three types of fruit were forms with colour dark, light, and intermediate. The combinations are shown in a table.—Lysenko All-union breeding institute, Odessa.

1652. SÖDING, H., BÖMEKE, H., AND FUNKE, H. Siebenjährige Versuche zur Ertragssteigerung von Möhren durch Samenbehandlung mit Wirkstoffen. (A seven year experiment to increase carrot yields.) *Planta*, 1949, 37: 498-509, bibl. 3.

Carrot seeds soaked in a 10% yeast extract or a weak solution of heteroauxin, aneurin, ascorbic acid, oestrone, caffeine and nicotinic acid and grown in pots, produced in some cases 30% heavier roots, with a smaller increase in foliage. This increase was confined to plants left in the shade, and the best results were obtained when plants were grown with moderate amounts of nutrients. The work was carried out at various botanical institutes in Western Germany 1942-48.

1653. MANN, L. K., AND MACGILLIVRAY, J. H. Some factors affecting the size of carrot roots. *Proc. Amer. Soc. hort. Sci.*, 1949, 54: 311-18, bibl. 11.

Data collected at Davis, California, are given on the effects of spacing and non-uniform germination on root size of carrots grown for bunching. Little relation was found between root diameter and spacing, but a relationship was found between the time of germination of individual seedlings and root size at harvest. This effect apparently results from competition advantage of early over late seedlings, and in so far as close spacing would increase this competition it would increase the variation in root size and hence the proportion of culls. Attention is directed to the extreme inherent variation in size among carrot roots, even where differences in time of germination and spacing are small. The effect of percentage germination and seed weight on seed rates required per acre is discussed in relation to spacing. Several treatments applied in an attempt to improve germination were unsuccessful.

1654. MACGILLIVRAY, J. H., AND CLEMENTE, L. J. Effect of irrigation on the production of carrot seed. *Proc. Amer. Soc. hort. Sci.*, 1949, 54: 299-303, bibl. 8.

Irrigation increased the yield of carrot seed grown under climatic conditions at Davis, California. Where sufficient winter rains fill a soil to field capacity to a depth of 6 feet, additional irrigation water of about 8 to 12 inches should be adequate in areas similar to Davis, California. The effect of irrigation on seed germination and size of seed was of minor importance. [Authors' summary.]

1655. HUCKETT, H. C.

DDT sprays and dusts for control of cauliflower and cabbage caterpillars on Long Island.

Bull. Cornell agric. Exp. Stat. 852, 1949, pp. 31, bibl. 20.

An account of experiments carried out in 1944-1947, with descriptions of the insecticides used, procedure, and methods. Formulations are given for four spray and four dust mixtures containing DDT.

1656. WITTWER, S. H., DAVIS, J. F., AND REATH, A. N.

Performance of Pascal celery varieties in Michigan.

Quart. Bull. Mich. agric. Exp. Stat., 1950, 32: 334-7, illus.

Of the 17 green or Pascal type celery varieties grown in this test, Superior gave the best all round performance as regards yield, number and length of stalks and storage quality, but was subject to leaf blight, while less valuable varieties showed no evidence of damage.

1657. WILSON, K. S.

Histochemical localization of acid phosphatase during the development of cucurbit fruits.

Abstr. in Amer. J. Bot., 1949, 36: 806-7.

The distribution of the enzyme glycerophosphatase was studied in cucurbit ovaries at four to five critical stages of development in several pure lines and F_1 hybrids of a cross between large- and small-fruited types. At all stages, regions of rapid cell division were associated with high acid phosphatase activity.

1658. WHITAKER, T. W., AND BOHN, G. W.

The taxonomy, genetics, production and uses of the cultivated species of *Cucurbita*.

Econ. Bot., 1950, 4: 52-81, bibl. 65, illus.

The 5 cultivated species of *Cucurbita* (*C. pepo*, *C. moschata*, *C. mixta*, *C. maxima*, and *C. ficifolia*) are comprehensively reviewed. Taxonomy is considered in detail and an identification key is included. The difficulties encountered in genetical examination due to the size and number of the chromosomes are emphasized. Some production statistics are given, as are quality and food value at different stages of maturity and various uses.

1659. WELLENSIEK, S. J.

Het voorkomen van entings-incompatibiliteit door eigen blad aan de onderstam. (The prevention of graft-incompatibility by own foliage on the stock.) [English summary 3 pp.]

Meded. Landb.Hoogeschool Wageningen, 1949, 49: 259-72, bibl. 12, illus., being *Publ. Lab. TuinbouwPl. Wageningen* 83.

The prevention of incompatibility when grafting *Cucurbita ficifolia* by leaving foliage on the stock is shown, and remarks are made on the possibility of interpreting the stock foliage's influence.

1660. EKBRANT, L.

Gurkodling i växthus. (Cucumber growing in the glasshouse.)

Årsb. svensk Jordbr. Forskn., 1950, pp. 77-92, illus.

Cultural methods are described, including control measures for pests and diseases.

1661. HALL, W. C.

The effects of emasculation in relation to nitrogen supply during the ontogeny of the gherkin.

Amer. J. Bot., 1949, 36: 740-6, bibl. 22.

The developmental responses of gherkin plants, from which all male flowers were systematically removed, were compared with those of sexually intact plants, at high and low levels of nitrogen nutrition. In addition, the effect of changing the nitrogen nutrition of emasculated plants from the low to the high level at anthesis was studied. Until the induction of flower primordia, growth of all plants was fairly uniform. After this, stem elongation of emasculated plants was less than that of the controls. This indicates a relationship between vegetative development and the sexual processes. The final vine length of plants grown at the high nitrogen level from anthesis onwards was equal to that of plants grown continuously at the high nitrogen level, although continuous low nitrogen nutrition resulted in shorter and fewer internodes. This demonstrates the effectiveness of late applications of nitrogen. At the high nitrogen level, sexually intact plants produced more leaves and a greater total leaf area than emasculated plants; under low nitrogen nutrition, the reverse was true. Nitrogen nutrition did not affect the time of flower bud formation, staminate flowers always being produced about 2 weeks earlier than pistillate ones. Fewer flowers were produced by emasculated plants than by the controls. High nitrogen plants produced more female flowers. Water absorption trends in all treatments were similar. Periods of minimal and maximal water uptake were intimately associated with certain developmental stages. Chemical analyses showed that emasculated plants, at both levels of nitrogen, contained a higher percentage of soluble sugars, hydrolysable polysaccharides, and total nitrogen than sexually intact controls at the final sampling.—Agricultural and Mechanical College of Texas.

1662. HEPBURN, G. A., AND BISHOP, H. J.

Experiments with poison baits for melon flies.

Fmg S. Afr., 1950, 25: 67-8.

Laboratory tests indicated that both 0.005% parathion and 0.01% BHC in sugar or golden syrup solutions were attractive and highly toxic to melon flies, being more effective than the formerly recommended sodium fluosilicate bait. A field trial on marrows with parathion also gave good control, and growers are recommended to try a bait consisting of $\frac{1}{2}$ to 1 oz. 15% wettable parathion and 3 lb. sugar in 4 gal. water.

1663. MIZEN, H.

Mustard and cress pay the winter wages.

Grower, 1950, 33: 616-19, illus.

An English grower describes his methods of large-scale production from November to April.

1664. HAYTER, C. N.

Onion growing (*Allium cepa* Linn.).

Rhod. agric. J., 1950, 47: 30-41, bibl. 13, illus.

Following tabulated data on yields, production and imports in Southern Rhodesia an account is given of recommended methods of cultivating onions under the following headings: Climate and sowing time, soils,

rotations, manuring and liming, soil preparation, sowing seed in nurseries and *in situ*, transplanting, trimming, mulching, cultivation, supplementary manuring, irrigation, harvesting and curing, storage, grading and marketing. Six varieties suited to local conditions are described, and brief accounts are given of seed production, pickling, and pests and diseases.

1665. WATSON, R. D., AND KENKNIGHT, G.

The effect of yellow dwarf on yield of onion seed.

Phytopathology, 1950, 40: 392-3.

Onion plants infected with yellow dwarf yield about one-third as much seed as plants not infected with this disease. The vigour and growth of the plants are affected as indicated by the length of the seed stalk.

1666. JONES, H. A., PERRY, B. A., AND DAVIS, G. N.

Growing the transplant onion crop.

Fmrs' Bull. U.S. Dep. Agric. 1956, revised 1949, pp. 26, illus.

Full cultural instructions are given for the production of seedling onions and transplanting the crop, with notes on varieties and common pests and diseases.

1667. OWEN, J. H., WALKER, J. C., AND STAHMANN, M. A.

Pungency, color, and moisture supply in relation to disease resistance in the onion.

Phytopathology, 1950, 40: 292-7, bibl. 11.

A study of the development of neck rot (*Botrytis allii*), smudge (*Colletotrichum circinans*), and black mould (*Aspergillus niger*). Much moisture greatly increased neck rot, which was more severe on mild than on pungent varieties. There was no difference in the mild class between the coloured and white varieties, but in the pungent class the coloured varieties had less disease than the white. Pungent varieties had less smudge than the mild varieties, white varieties more than coloured. High moisture increased smudge. Black mould was rather more severe under dry than under moist conditions, with little difference on white and on coloured varieties under dry conditions, but more severe on the coloured than on the white varieties under moist conditions. Pungency was not important in determining the incidence of black mould.—Univ. of Wisconsin, Madison, Wis.

1668. VISCHER, E. B., HOWLAND, S. R., AND RAUDNITZ, H.

Viridin.

Nature, 1950, 165: 528, bibl. 3.

The antibiotic viridin, produced by a pigment forming strain of the common soil fungus *Trichoderma viride*, was found to be very active against *Botrytis allii*. Spore germination was prevented by a concentration of 0.019 p.p.m. α -viridin or 0.156 p.p.m. β -viridin. The isolation and purification of the compound is described.—I.C.I., Butterwick Res. Labs., Welwyn, Herts.

1669. MUIRHEAD, I.

The fungistatic activity of ethylenic and acetylenic compounds. III. The fungistatic activity of tetraiodoethylene and related compounds.

Ann. appl. Biol., 1949, 36: 250-6, bibl. 12.

An account of spore germination tests with conidia of *Botrytis allii*.—I.C.I. Laboratories, Welwyn, Herts.

1670. ELMORE, J. C.

Thrips injury to onions grown for seed.

J. econ. Ent., 1949, 42: 756-60, bibl. 8, illus.

Thrips, *Thrips tabaci* and *Frankliniella occidentalis*, destroy many buds by direct attack, and by damaging the pedicels. Plants dusted with 10% DDT compared favourably with those undusted on 7 plantations of onions grown for seed in several areas of southern California. Seed yields on DDT-treated plots were higher than on untreated fields and bees visited dusted flowers in preference to undusted ones.

1671. WHITAKER, C. H.

Uruguay develops a modern pea industry.

Foreign Agric., 1950, 14: 72-5.

A large-scale pea industry based on canning has been built up during the past 5 years near Rincón del Pino, 50 miles north-west of Montevideo. Rotations, manuring, cultural methods, mechanical harvesting and the use of the vines for ensilage are outlined briefly.

1672. HÄNSEL, H.

Studie über die Temperatursumme als Mass für den Entwicklungsabschnitt: Aufgang bis Blühen bei Gemüseeerbsen. (The temperature sum as a measure of the growth phase of garden peas, from appearance of cotyledons to flowering.)

Bodenkultur, 1950, 4: 35-43, bibl. 12.

In describing the varietal characters of garden peas for general or breeding purposes it is desirable to state the time that elapses between the appearance of the cotyledons and flowering, since this phase is closely related to the total period between germination and maturity. Given optimum day length the temperature sum was shown to be a much more reliable index of the "rate of uninhibited development" of a variety than was the number of days required. In the experiments with 5 varieties, for which data are presented, the most uniform results were obtained by adding all temperatures above +5° C. during the period: 50% germination to 50% flowering. The temperature sum ceased to be a dependable measure of developmental rate when extreme variation of temperature occurred.

1673. ANGELL, H. R.

Seedling blight. I. Seed colour and soil in relation to pre-emergence blight of William Massey peas.

Aust. J. agric. Res., 1950, 1: 33-42, bibl. 14.

Emergence of William Massey pea seeds supplied by 19 growers varied from below 50% to more than 80% in a local soil. The percentage emergence of green peas was significantly higher than that of yellow peas, that of yellow-green peas being intermediate. In three different soils emergence of a sample of peas was 39, 60 and 83%, differences being due mainly to the influence of the soil environment on the susceptibility of the yellow pea fraction to pre-emergence blight caused by a fungus generally known as *Pythium ultimum* Trow. Percentage emergence of yellow and green peas also appears to be inversely correlated with reported soil fertility. In addition to the usual dusting methods, control of pre-emergence blight of peas may

be improved by using resistant seed and by selecting suitable soils where possible.—C.S.I.R.O.

1674. SCHREUDER, J. C.

Voet-en vaatziekten bij erwten. (Foot and vascular bundle diseases of peas.)

Reprint from *Tien jaren P.S.C., jubileumuitgave Peulvruchten Studie Combinatie*, Wageningen, 1949, pp. 136-43.

A study of the trouble popularly known as "foot-rot" of peas has been undertaken by the Agricultural Research Station and Soil Science Institute T.N.O. at Groningen since 1942, with the result that a number of different fungi have been found to be responsible for the trouble. In Holland the most important of these are *Ascochyta pinodella* and *Fusarium solani*, causing external discoloration of the base of the stem and the roots, and *Fusarium oxysporum* f. *pisi*, races I and II, affecting the vascular bundles. The symptoms are distinguished, and the distribution of the diseases in Holland and the factors affecting their development are discussed. The most promising solution to the problem lies in the breeding of resistant varieties.

1675. BRONSON, T. E., DUDLEY, J. E., AND CHAPMAN, R. K.

Liquefied-gas aerosols for pea aphid control.

J. econ. Ent., 1949, 42: 661-3, bibl. 4.

Although tetraethyl pyrophosphate and parathion aerosols gave good control of pea aphid (*Macrosiphum pisi*), DDT dust appears to be more practical and economical at the present time. DDT and hexaethyl tetraphosphate aerosols only gave fair control.—U.S.D.A. Bur. Ent. Pl. Quar.

1676. MIDDLEKAUFF, W. W., AND PRITCHARD, A. E.

Field tests to control the mite *Penthaleus major*.

J. econ. Ent., 1949, 42: 852, bibl. 3.

Good results were obtained on plots of young pea plants with 3% DDT dust; 1% parathion dust; and parathion 25% wettable spray.

1677. JANCKE, O.

Zur Bekämpfung des Erbsenkäfers (*Bruchus pisorum* L.). (The control of the pea beetle *B. pisorum*.)

NachrBl. dtsh. PflSchDienst, 1948, 2: 186-7, bibl. 15 [received 1950].

In a comparative field test parathion and the benzene hexachloride preparation, Nexit, were found to give a considerable reduction in pea beetle infestation.

1678. HINMAN, F. G., BRINDLEY, T. A., AND SCHOPP, R.

Hibernation of the pea weevil.

J. econ. Ent., 1949, 42: 746-53, bibl. 1.

Pea weevil, *Bruchus pisorum*, survival observed in Washington and Idaho over 4 years averaged: 56% about the bases of pine trees, 40% in pine duff, 22% in bush and 11% in grass. No weevils appear to overwinter within shattered peas in the field. They emerged first in grass, then in bush, followed by those in pine duff and about the bases of pines. The success of control is determined to some extent by the percentage of surviving weevils that have emerged when the first peas are dusted.

1679. KLEMM, M.

Über einige Abnormalitäten in der Entwicklung von Kürbissen *Cucurbita pepo* L. (On some abnormalities in the development of pumpkins.)

NachrBl. dtsh. PflSchDienst, 1948, 2: 216-17, illus. [received 1950].

The following abnormalities are recorded and illustrated: (1) The germination of seeds inside stored pumpkins; in one case the hypocotyls had an average length of 20 cm. and in another the cotyledons were distinctly pale-green. (2) The development of seedless, parthenocarpic fruits. These pumpkins had the shape of normal fruits but hardly reached half normal weight.

1680. VERBRUGGEN, A.

De rabarber. (Rhubarb.)

Cult. Hand., 1950, 16: 173-5, illus.

The history of the introduction of rhubarb from Asia into Europe is outlined; notes are given on *Rheum* spp., and the varieties grown in Holland are mentioned.

1681. LORENZ, O. A.

Growth rates and chemical composition of fruits of four varieties of summer squash.

Proc. Amer. Soc. hort. Sci., 1949, 54: 385-90, bibl. 3.

At Davis, California, Black Zucchini fruits reached a stage large enough for commercial harvest 3 days, White Bush Scallop and Early Prolific 4 days and Summer Crookneck 6 days after blossoming. Chemical composition of fruits of all the varieties except Summer Crookneck was very similar. Taking Early Prolific as an example, fruits in prime market condition on the fifth day contained slightly over 6% total solids, nearly 3% alcohol-insoluble solids, slightly over 2% reducing sugars, about 1% fructose and 0.2% sucrose.

1682. VANDER MEULEN, E., AND HENKE, F.

Cold testing of seed corn.

Seed World, 1948, 63: 7: 8, 10 [received 1950].

Cold testing is a method of (1) determining the vitality of seeds exposed to unfavourable growing conditions immediately after sowing, and (2) evaluating the efficiency of seed protectants. The technique, which was developed a few years ago at Iowa State College, consists of sowing seeds in a *Pythium* infested medium and placing them in a cold chamber at 45° F. for 7 days, during which time the medium is kept very moist. They are then transferred to a chamber where ideal conditions for germination and seedling growth are maintained, and the percentage healthy germination is recorded. By pre-treating the seed with various fungicides, their relative value as seed protectants can be compared. Results of recent tests on 2 sweet corn varieties are recorded as an illustration. The cold testing technique can also be used by the plant breeder for evaluating the inherent vigour and disease resistance of his material.

1683. HASKELL, G.

Studies with sweet corn. II. Sowing dates and plant characters.

Emp. J. exp. Agric., 1950, 18: 1-7, bibl. 2.

Six varieties of sweet corn were sown on 1 and 28 March, 26 April and 24 May. Both March sowings flowered

simultaneously but thereafter the later the planting the shorter the interval to flowering. Maturity was directly proportional to flowering time; hence this character gives a good indication of harvesting date. Earlier sowing gave shorter plants with fewer tillers, while later sowing gave more ears with higher row number. Protandry and length, width and weight of ears were not materially affected by sowing date. 1 March sowing gave very poor yields [although the reverse is suggested by the author's summary] and best yields were obtained from 28 March and 26 April sowings. It is suggested, therefore, that sweet corn should be sown in early April in England.—John Innes Horticultural Institution, Merton Park.

1684. MACGILLIVRAY, J. H.

Effect of irrigation on the growth and yield of sweet corn.

Proc. Amer. Soc. hort. Sci., 1949, 54: 330-8, bibl. 8, illus.

The growth of sweet corn is greatly reduced by insufficient soil moisture as measured by yield of marketable ears, size of plant, and dry matter produced. The size of marketable ears is only slightly smaller, but many ears were of no market value when the moisture supply was limited. The leaves of a corn plant roll with insufficient soil moisture, and growth may be so rapid that this condition exists for a short period each day on plants receiving ample applications of irrigation water. [Author's summary.]—Davis, California.

1685. CLORE, W. J., AND VIETS, F. G., JR.

Sweet corn fertility studies on newly irrigated lands in the Yakima Valley.

Proc. Amer. Soc. hort. Sci., 1949, 54: 378-84, bibl. 9, being Sci. Pap. Wash. agric. Exp. Stats. 849.

In a one-year study on Golden Cross Bantam sweet corn, comparisons were made between the use of F.Y.M., winter legume green manures, various N application rates and different plant spacings. Winter legumes gave better results than F.Y.M., and considerable yield increases and lower corn ear worm infestation resulted from N applications up to maximum doses. The highest yield (7.15 tons per acre) of usable sweet corn followed ploughing in of a vetch cover crop supplemented with 160 lb. N. Regardless of other treatments, 9 in. spacing in rows, giving 21,780 plants per acre, gave generally higher yields and larger size of usable ears than 6 in. spacing, giving 32,671 plants per acre.

1686. BAKER, W. A., BRADLEY, W. G., AND CLARK, C. A.

Biological control of the European corn borer in the United States.

Tech. Bull. U.S. Dep. Agric. 983, 1949, pp. 185, bibl. 44, illus., 50 cents.

An account of the insect parasites of the European corn borer, *Pyrausta nubilalis* (Hbn.), a serious pest of field and sweet corn in the United States and Canada. Insect predators, birds and diseases are also briefly mentioned. During the years 1919-40 over 23 million larvae from Europe and 3 million from the Orient were collected and brought to the United States for rearing the borer's natural enemies contained in them.

1687. PORTE, W. S., AND WALKER, H. B.

Sunray, a new golden wilt resistant tomato.

Seed World, 1950, 66: 4: 10-12, illus.

A description of the characters and performance of this yellow-fruited tomato variety, bred for resistance to *Fusarium* wilt at the Plant Industry Station, Beltsville. It was developed from a cross between the resistant Pan America and the yellow-fruited Jubilee. The plant and fruit characters are quite similar to Jubilee, but it is highly wilt resistant; trials on wilt-free soil showed no significant difference in productivity.

1688. TULJŽENKOVA, F. F.

Variety trials of tomatoes under glass in the far north. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 46-50.

The data, tabulated, indicate that, of the varieties tested, Bison is the most suitable for growing under glass in the northerly regions of the U.S.S.R.

1689. NILSSON, E.

Kunna tetraploida tomaten bli odlingsvärda? (What are the prospects of tetraploid tomatoes?)

Årsb. svensk. Jordbr. Forskn., 1950, pp. 99-108, bibl. 6.

In small-scale trials with four tetraploid strains of tomato the author found the diploid parents to be superior in total yield, earliness and fruit size. Cross breeding between the four strains, however, increased the yield of one hybrid to that of one of the diploid parent varieties. As tetraploids combine greater vegetative vigour and later senescence with excellent fruit quality, the opinion is expressed that tetraploidy might possibly be useful in the improvement of tomato varieties.—J. E. Ohlson's Enke plant improvement station, Malmö.

1690. KLINKER, J. E., AND SWEET, R. D.

An investigation of the yield performance of several tomato varieties.

Proc. Amer. Soc. hort. Sci., 1949, 54: 253-60, bibl. 4, being Pap. Dep. Veg. Crops, Cornell Univ. 319.

Two greenhouse studies at Cornell University are described, which were designed to study possible reasons for varietal differences in yield and blossom-end rot observed in field trials in the two preceding years. With 6 varieties grown in sand culture solution a highly significant positive correlation was found between dry weight of roots and yield in the field trials, but none between dry weight of tops and yield. Varieties that had produced high yields in the field showed significantly lower rates of leaf respiration than those producing low or erratic yields. In the second experiment to determine varietal efficiency in utilizing low amounts of N, P, and K, there were no differences in response of the 6 varieties to low N and P, but with low K one variety, John Baer, produced significantly heavier dry weights of both tops and roots than the other five varieties. This more efficient utilization of K by John Baer may be due to some factor in its genetic constitution.

1691. WHALEY, W. G., AND TSAO, T.-H.

A comparative physiological study of inbred and hybrid tomato plants.

Abstr. in Amer. J. Bot., 1949, 36: 806.

A hybrid tomato (*Lycopersicon esculentum* × *L. pimpinellifolium*) and its inbred parents were grown in culture from seed to fruiting. Weekly samples were taken for growth measurement and various physiological studies. Results show that the hybrid plants are, in general, higher in water content and lower in ash content (per unit of dry weight). Physiological similarities involved in heterosis and polyploidy are noted and discussed. [From authors' abstract.]—University of Texas, Austin.

1692. RICK, C. M., AND ROBINSON, J.

Mutations affecting flower structure and fruitfulness in *Lycopersicon esculentum*.

Abstr. in Amer. J. Bot., 1949, 36: 801-2.

Seven naturally occurring mutations of the tomato plant are described, in which the flower structure is such that self-pollination is hindered.—University of California, Davis.

1693. KRAEVOI, I. M.

Obtaining a new form of tomato by the conjoint method of vegetative and sexual hybridization. [Russian.]

Agrobiologija (Agrobiology), 1949, No. 4, pp. 109-15, illus.

The author describes an attempt to produce a tomato variety of good quality but more resistant to cold than existing commercial varieties. A red-fruited tomato (*Lycopersicon esculentum*) was grafted on potato (to "shatter" its inherited propensities before fertilization) and when in flower was pollinated from a wild cherry-shaped species (*L. cerasiforme*). In order to induce cold resistance the seeds of the first and second generations were sown in winter in the open ground so that as they swelled they were subjected to the prolonged influence of low temperature. Control plants (crossed without grafting) yielded progeny not markedly different from the parent plants. From the treated plants a new variety, which bred true, was eventually raised. It is described in detail under the name Pridneprovskii; it has red fruit, is said to be relatively resistant to cold, and has a high vitamin content.—Kiev breeding station for vegetables and potatoes.

1694. HEIMSCH, C., RABIDEAU, G. S., AND WHALEY, W. G.

A developmental analysis of stem structure in the tomato.

Abstr. in Amer. J. Bot., 1949, 36: 797.

"Preliminary studies indicate marked differences in the growth of all tissues of the hypocotyl and lower internodes as contrasted with the higher stem internodes. An attempt is made to relate development of stem structure to morphological development and behaviour in absorption and distribution of radioactive phosphorus which were studied separately."

1695. RABIDEAU, G. S., WHALEY, W. G., AND HEIMSCH, C.

The absorption and distribution of radioactive phosphorus by tomato plants at various developmental stages.

Abstr. in Amer. J. Bot., 1949, 36: 801.

Little or no radioactive phosphorus was found in the insoluble protein or crude fiber fractions, small amounts

of P^{32} were found in the lipid plus pigment and soluble carbohydrate fractions, and relatively large amounts of radiophosphorus were detected in the starch and lead precipitate fractions. With increasing age of the plants, greater amounts of P^{32} were found in the more apical leaves and internodes. The stem apices and flowers possessed only a slight amount of radioactive phosphorus. [From authors' abstract.]—University of Texas, Austin.

1696. WHALEY, W. G., HEIMSCH, C., AND RABIDEAU, G. S.
The developmental morphology and growth of the tomato.

Abstr. in *Amer. J. Bot.*, 1949, 36: 806.

Plants of a yellow plum variety of *Lycopersicon esculentum* Mill., were grown to maturity in aerated liquid culture. At 2, 3, 5 and then 7 day intervals plants were harvested in lots for growth measurements, anatomical studies, and chemical analysis. Complete growth curves showing increases in total fresh and dry weight, leaf number, leaf surface area were presented. Relative growth of the individual parts is then compared with the growth of the whole plant. These data furnish the background for study of the anatomy and evaluation of the chemical composition at various developmental stages. [Authors' abstract.]—University of Texas, Austin.

1697. JOHANNESSEN, G. A.
Skin puncture studies on red-ripe tomatoes.
Proc. Amer. Soc. hort. Sci., 1949, 54:
272-6, bibl. 2, illus., being *J. Art. Purdue agric. Exp. Stat.* 339.

Apparatus designed at Purdue University to measure the force necessary to puncture the skin of red-ripe tomatoes is described and illustrated. Using variety 222 it was found that the stem end of the ripe fruit was significantly less resistant to puncture than the middle of the fruit, and the middle significantly less than the blossom end. There were, however, some reversals of this trend, and there were significant variations in resistance to puncturing as between plants and between different fruits on some plants.

1698. HITCHINS, P. E. N.
A problem for [tomato] growers.
Fruitgrower, 1950, 109: 413-14.

A few observations on the production of roughs and rogues in tomatoes. "Devon Surprise" and Carter's "Sunrise", widely grown out of doors in Jersey, produce practically no roughs. Under glass many varieties that normally produce perfectly shaped fruits show a tendency to produce less well-shaped fruits when grown on new soil. The type of rogue plant known as a Jack shows considerable resistance to *Cladosporium*, and, although normally it bears no fruit, if systemically sprayed with a fruit-setting hormone it will produce an enormous crop of well-shaped fruit. If it were possible to establish a strain that would produce nothing but Jacks these characters might be put to good use. Occasionally Jack plants will produce self-fertilized fruits. These fruits contain very few seeds but, when sown, they all develop into Jack plants. This fact suggests that the Jack character is produced by a simple recessive gene.

1699. STOCK, F. G.
The estimation of tomato solids in tomato products by a method involving the determination of lycopene by absorption spectroscopy.

Analyst, 1950, 75: 117-26, bibl. 26.

A simple and rapid analytical procedure is described, and lycopene contents are given for English tomatoes in various stages of ripeness and for commercial concentrated purees.

1700. MCGUIRE, D. C.
Conditions affecting the storage life of tomato pollen.

Abstr. in *Amer. J. Bot.*, 1949, 36: 801.

Tomato pollen collected at different dates was stored in various conditions of temperature and humidity. At all temperatures, pollen stored in low humidity produced fruit and seed long after that in high humidity failed to do so. The lower the temperature of storage, the longer was the life of the sample. Decline of ability to set fruit seemed to be linear, and very slow in the longer-lived samples. Decline of ability to set seed was not noted until near the death of the sample, and seemed to be logarithmic. Some fruits were set parthenocarpically just previous to the death of many samples. Pollen collected during or just after a period of unfavourable weather had a much reduced viability both initially and in storage, and its storage life was comparatively short. Ovules also showed reduced fertility during unfavourable weather. Pollen stored under optimum conditions of the experiment (0° C. and low humidity) produced fruit after a year, but the practical limit of pollen storage for seed production appears to be 6 months.—University of California, Davis.

1701. CAROLUS, R. L.
Calcium and potassium relationships in tomatoes and spinach.
Proc. Amer. Soc. hort. Sci., 1949, 54:
281-5, bibl. 8, being *J. No. Mich. agric. Exp. Stat.* 1101.

On an acid soil with pH 5.3, low in exchangeable K and Ca, neither Ca (applied as magnesium limestone at up to 4 tons per acre 2 years earlier) nor additional K, applied independently, increased the yields of tomatoes but significant increases resulted when the two treatments were applied in conjunction. The residual effect of cow manure applied at rates up to 30 tons per acre 2 years earlier was comparable with that of K fertilizers, which may be related to its ability to keep K from being fixed by preventing fluctuations in soil moisture. In a second experiment tomato and spinach plants were transferred from soil to culture solutions in which different amounts of Ca and K were supplied. Spinach was found to be able to absorb larger quantities of K than tomatoes from solutions with a relatively low concentration of K. It is suggested that tomatoes may require a relatively greater K concentration in the soil in relation to Ca concentration than does spinach or other plants with a low Ca content.

1702. KIDSON, E. B., AND STANTON, D. J.
The ammonia and nitrate content of glass-house tomato soil under different treatments.
N.Z. J. Sci. Tech., Ser. A, 1948, 30: 187-92
[issued March 1950].

The effect of sterilization with steam, chloropicrin, D-D and gammexane on the ammonia and nitrate content of the soil was examined. These methods of sterilization differed in their effect on nitrification in the soil. All methods of sterilization brought about increases in yield and growth. Gammexane at the rate used was the least effective. Differences in available nitrogen between sterilized and unsterilized plots did not seem to be sufficient to account for the differences in yield and growth. High ammonia nitrogen present in the early stages of plant growth in certain sterilized plots did not appear to affect the yield of fruit. Heavy dressings of cocoa husks increased growth and yield on unsterilized soil and increased the inorganic nitrogen level of the soil. [Authors' summary.]—Cawthron Institute, Nelson, N.Z.

1703. EMMERT, E. M.

Tissue analysis in diagnosis of nutritional troubles.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 291-8, bibl. 21.

The literature is reviewed and reference is made to studies in Kentucky on variations in requirements of N, P and K at different stages of growth in crops. N and P curves of critical needs based on tissue tests from 10 crops are given for tomatoes and N and K curves for potatoes. The former have been described in more detail in an earlier paper [see *H.A.*, 15: 1167]. The data on potatoes have just been published in *Bull. Ky agric. Exp. Stat.* 529.

1704. MANN, L. K., AND MINGES, P. A.

Experiments on setting fruit with growth-regulating substances on field-grown tomatoes in California.

Hilgardia, 1949, **19**: 309-37, bibl. 22.

Twenty-nine experiments were carried out in 11 counties of California during 1945-47. Chemicals used were β -naphthoxyacetic (NOA), 2,4-D and 4-chlorophenoxyacetic (4-CPA) acids and the Na salt of 4-CPA. All proved effective in increasing fruit set or the early yield of fruit in all but 3 tests. Water sprays proved more satisfactory than dusts or aerosols, as it was difficult to restrict the latter to the flower trusses and hence damage to foliage was liable to occur. 4-CPA was preferred, especially in a water spray of 50 p.p.m., because NOA was more expensive and 2,4-D more liable to cause injury. In addition to increasing the set of early trusses the treatments consistently increased fruit size, especially at lower concentrations of 4-CPA, and altered fruit shape slightly but not to an objectionable extent. The general effect was to shift the yield of fruit to an earlier period rather than to increase the total yields of the plants. Owing to the risk of plant injury growers are urged to proceed cautiously in the use of growth substances and to use minimum concentrations likely to be effective.

1705. GORTER, C. J.

The influence of 2,3,5 triiodobenzoic acid on the growing points of tomatoes.

Reprinted from *Proc. Akad. Wet. Amst.*, 1945, **52**: 1185-93, bibl. 8, illus., being *Publ. Lab. Tuinbouwpl. Wageningen* **85** [received 1950].

TIBA inhibits the longitudinal growth of unicellular

organs, but the production of cell wall material continues. Growing points of tomato plants, treated with TIBA, are altered in shape, and the production of leaves, but not flowers, is inhibited. In the treated plants the terminal and axillary growing points (even the axillary buds of the cotyledons) may develop into inflorescences, and they can produce more flowers than untreated plants growing under the same conditions.

1706. HEMPHILL, D. D.

The importance of time of application of "hormone" sprays to improve greenhouse tomato yields.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 261-4, bibl. 4, being *Contr. J. Ser. Dep. Hort. Mo. agric. Exp. Stat.* **1154**.

Three experiments at the Missouri agric. Exp. Stat. are described in which Master Marglobe tomatoes were sprayed with *p*-chlorophenoxyacetic acid mainly at 10 p.p.m., α -naphthaleneacetic acid mainly at 20 p.p.m. and β -naphthoxyacetic acid at 50 p.p.m. Spraying at anthesis (flowers fully open) gave good results, but spraying 4 days after anthesis gave the greatest increase in yield, possibly owing to the presence of more seeds per fruit. Spraying 8 days before anthesis on the other hand inhibited normal flower development and reduced both fruit set and size.

1707. COSTE, A., AND GAGNARD, J.

Application de phytohormones synthétiques aux cultures de tomates algériennes. (Treatment of field tomatoes in Algeria with growth substances.)

Fruits et Prim., 1949, **19**: 413-18, bibl. 7, illus.

Some of the results are given of trials in 1948 on the effects of spraying tomato flower trusses with hormones. Ten p.p.m. 2,4-D induced much earlier maturity, but a greatly reduced total yield. β -naphthoxyacetic acid induced somewhat earlier maturity in both spring and autumn crops and also slightly increased the total yield. [It is not clear what concentrations were used.]

1708. GREWE, F.

Die Verwendung von Wuchsstoffen' im Tomatenbau. (The use of growth substances in tomato culture.)

Höfchen Briefe, 1950, **3**: 2: 3-10, illus.

The advantages and disadvantages of the effect of hormone preparations on tomato plants are discussed. Preparation 8159 [Bayer-Plantprotection, Leverkusen, Germany] was found more consistent than 8157. It is marketed as "Tomafix".

1709. THELLMANN, W.

Ist eine Ernteverfrühung bei der Tomatenkultur im Freiland möglich? (Earlier picking of outdoor tomatoes.)

Höfchen Briefe, 1950, **3**: 2: 11-17, illus.

Picking fruit of tomato plants treated with hormone product 8157 started 3 weeks earlier than that of untreated plants in Western Germany. Four to five treatments at 6 to 8 days' intervals were found sufficient. As soon as the harvesting of the untreated tomatoes began, yields ran parallel till the end of the season. Fruits of the treated plants were larger and contained fewer seeds though they were never completely seedless.

1710. FIDLER, J. C., AND NASH-WORTHAM, J. R. H.

Ripening of tomatoes.

J. hort. Sci., 1950, 25: 181-9, bibl. 2.

Experiments made at the D.S.I.R. Covent Garden Laboratory, in London, with 3 varieties of English tomatoes and with Canary Island tomatoes are described. The authors summarize their results as follows: "1. English glasshouse and outdoor tomatoes may be ripened to good quality, from the green or turning stage, by holding at 65°-70° F. at high relative humidity. 2. The rate of ripening may sometimes be accelerated by the use of ethylene, but this gas usually produces very little or no effect."

1711. PRIMOST, E.

Dauerkontrolle des Körpergewichtes bei Pflanzenschutz- und Kulturmassnahmen. (Changes in the weight of plants as affected by plant protection and cultural measures.)

Bodenkultur, 1950, 4: 78-88, bibl. 13, illus.

Werner's method [see *H.A.*, 18: 1568] has been used to study the effect of certain cultural measures on the development of plants, as expressed by changes in their weight. Tomatoes watered with cold water (11° C.) suffered a 16% depression of growth by comparison with plants watered with water at 15° C. Increasing the water temperature to 25° C. did not result in any significant increase in weight. For one week following the transplanting of tomato seedlings the weight increase was reduced by nearly 50%. Ten days after spraying tomato plants with copper oxychloride a 70% depression of growth was evident, while DDT- and sulphur-sprays did not hinder development.—Inst. f. Obst- u. Gartenbau, Hochschule f. Bodenkultur, Vienna.

1712. ANON.

Molybdenum deficiency in glasshouse tomatoes.

Fruit World, Melbourne, 1949, 50: 10: 19.

So far as is known the first case of naturally occurring molybdenum deficiency in commercial tomato crops under glass was observed in New South Wales, Australia. Three cases on outdoor crops had been reported previously, also in New South Wales. No description of symptoms is given.

1713. GLASSCOCK, H. H., AND DERMOTT, W.

Tomato root injury due to Cheshunt compound.

J. hort. Sci., 1950, 25: 151-4, illus.

In trials over 2 seasons Cheshunt compound supplied to Potentate tomato seedlings at normal rates, but more frequently than recommended, checked growth of plants and damaged roots. The pH of the loam component of the compost used was 7.1. In a parallel trial where acid loam of pH 5.1 was used, root damage and growth inhibition were negligible.—N.A.A.S., Wye.

1714. BLENOWE, J. W., AND CALDWELL, J.

Aspermy—a new virus disease of the tomato.

Ann. appl. Biol., 1950, 36: 320-6, bibl. 6.

A new virus disease, "aspermy", of tomato completely suppressed seed formation in the fruits set after

infection. Even when seed is formed on a diseased plant, the amount of viable seed in those fruits formed at about the time of the infection is very small. The virus is sap transmissible to tomato plants. It was transmitted by *Myzus persicae* from infected to healthy tobacco plants, but not from or to other hosts.—University College, Exeter.

1715. CAPOOR, S. P.

The movement of tobacco mosaic viruses and potato virus X through tomato plants.

Ann. appl. Biol., 1949, 36: 307-18, bibl. 19.

Tomato aucuba mosaic virus, tobacco mosaic virus and potato virus X took 3-5-4, 5 and 3 days respectively to move from inoculated tomato leaflets into the petioles and stems. Each travelled through the stem more than 80 cm. during the first 12 hours after entering it.—Rothamsted Experimental Station, Harpenden, Herts.

1716. HENDRIX, J. W., MURAKISHI, H., AND LYLE, J. A.

Tomato defoliation diseases in Hawaii and experiments on their control.

Bull. Hawaii agric. Exp. Stat. 101, 1950, pp. 19, bibl. 6, illus.

Four leaf diseases commonly causing defoliation in Hawaii are described, namely grey leaf spot, early blight, late blight and Septoria leaf spot. In spraying trials carried out over 3 years 7 organic compounds were compared with 4 copper sprays. Spraying 7 to 12 times gave significant increases in yield from the use of some of the sprays, prominent among which were Zerlate, Fermate, tribasic copper sulphate and Yellow Cuproside.

1717. NATTRASS, R. M.

Tomato blight in Kenya.

E. Afr. agric. J., 1950, 15: 116-17, bibl. 3, illus.

Tomato blight (*Phytophthora infestans*), first recorded on tomatoes in East Africa in 1944, is described. Control measures include keeping successive crops of potatoes and tomatoes separate, staking and spacing the plants and spraying with bordeaux mixture or other copper fungicides.

1718. WILHELM, S.

Vertical distribution of *Verticillium albo-atrum* in soils.

Phytopathology, 1950, 40: 368-76, bibl. 16.

Tomato plants, as a susceptible host, were used to measure the infestation. The 0-6-in. and 6-12-in. depths were found on the whole to contain 3 to 4 times the degree of infestation of the deeper soil layers.

1719. GORLENKO, M. V., AND VORONKEVIČ, I. V.

Bacterial black spot of tomato. [Russian.]

Doklady Vsesojuz. Akad. sel'sk. Nauk S.S.S.R., 1950, No. 3, pp. 24-9, bibl. 6.

In Russia tomato bacterial black spot, attributed to *Bacterium vesicatorium* Doidge, was first found in 1936, and it has since been observed in a number of regions. Recommendations for its control are: (a) Where the disease has been observed the soil should be changed and all woodwork in the frames disinfected, (b) seed obtained from places where the disease has occurred should be disinfected, and (c) in the open ground all plant debris should be buried by deep ploughing in autumn.

1720. STRONG, M. C.
Comparison of fungicidal sprays for the control of tomato blights.

Quart. Bull. Mich. agric. Exp. Stat., 1950, 32: 338-47, illus.

"Except in a very dry, hot growing season, applications of any of the [13 tested] fungicides will apparently improve the quality or grade of fruit produced and some will probably increase yield." In seasons when blights are prevalent applications will definitely increase yields.

1721. MICHELbacher, A. E., AND OTHERS.
Further investigation of control of tomato insects in Northern California.

J. econ. Ent., 1949, 42: 666-74, bibl. 6.

The results of investigations carried out over a period of 3 years confirm the preliminary conclusions that DDT and DDD are generally much more effective than calcium arsenate for the control of tomato caterpillars [see H.A., 18: 2742]. A 5% DDT dust at 30 lb. per acre, however, is not so effective against the tomato hornworm (*Protoparce sexta*), but satisfactory control can be assured by the use of an equivalent amount of DDT applied as a wettable powder in a suspension or emulsion spray. A satisfactory control of tomato caterpillar was given by a 10% Toxaphene dust, and when used in combination with DDT this material gave excellent results. Methoxychlor was no more effective than calcium arsenate. For control of the tomato mite (*Phyllocoptes destructor*) the above insecticides should be used in conjunction with sulphur. After DDT and DDD had been used extensively on tomatoes for 2 years, a marked increase in the population of formerly unimportant tomato pests, including the leaf miner (*Liriomyza* sp.), the saltmarsh caterpillar, and a mite (probably *Tetranychus pacificus*), was observed. Whether the new insecticides are responsible for this increase requires investigation. Residue studies indicate that there is no serious danger from residues of DDD, DDT or DDT-Toxaphene treated tomatoes used for canning. The residue in the pomace, however, is considerably higher than that on the washed fruit or in the extracted juice.

1722. RATKOVICH, M.
Gorgojo del tomate (*Phrydenus muriceus* (Germ.)) en Tucumán. (The tomato weevil in Tucumán.)

Bol. Estac. exp. agric. Tucumán 65, 1949, pp. 20, bibl. 13, illus.

RATKOVICH, M.
Forma de combatir al gorgojo del tomate. (Control of the tomato weevil.)

Circ. Estac. exp. agric. Tucumán 144, 1949, pp. 2.

The bulletin gives a description of the pest and a detailed account of its life history, habits and control. Although it attacks all species of *Solanum*, in Tucumán it is only found in tomato crops, to which it causes very serious damage. The adult weevil eats through the stems of young plants, and the larva attacks the roots. Rotation, weed control and deep ploughing are the cultural control measures recommended. In experiments on chemical control made at the Tucumán Agricultural Experiment Station, benzene hexachloride, DDT and Velsicol 1068 chlordan were the only materials

that gave satisfactory results. A 10% benzene hexachloride dust placed round the base of the plants 4 or 5 times during the summer was found to give the best control. The existence of a parasitic fungus, probably a *Monilia* sp., suggests a possible method of biological control.

The circular briefly gives the same information concerning habits and control.

1723. LIAO, S. C., AND DUNLAP, A. A.
Arrested invasion of *Lycopersicon peruvianum* roots by the root-knot nematode.

Phytopathology, 1950, 40: 216-18.

The penetration, by *Heterodera marioni*, of the seedling roots of the South American tomato, *Lycopersicon peruvianum*, was studied microscopically in comparison with roots of the common tomato, *L. esculentum*. In the 2-day-old seedlings the nematodes had penetrated the root tips of *L. esculentum* and were abundant in the distal portion of the central cylinder, while in *L. peruvianum* only a few nematodes had penetrated the root near its tip and were located mostly in the peripheral cells. In a second experiment in which seedlings were grown for 4 weeks before removal from the soil the seedlings of the susceptible species became yellow and died, while only 3 out of 40 seedlings of *L. peruvianum* showed typical root-knots. The roots of *L. peruvianum* offer a striking illustration of resistance to nematodes.

1724. HUNTER, A. S., KELLY, W. C., AND SOMERS, G. F.

Effects of variations in soil moisture tension upon the ascorbic acid and carotene content of turnip greens.

Agron. J., 1950, 52: 96-9, bibl. 13.

Shogoin turnips were grown in greenhouse experiments, under three ranges of soil moisture tension. Plants grown under high soil moisture tension had a significantly lower yield than those grown under low moisture tension. Plants under high moisture tension had a higher percentage dry weight, higher ascorbic and carotene content on the fresh weight basis, but less ascorbic acid on the dry weight basis. Variations in soil moisture had, however, no practical effects over moisture ranges at which tender succulent greens were produced.

Potatoes.

(See also 1715, 2142.)

1725. SYMON, J. A., AND M'INTOSH, T. P.
Dutch Agriculture.

Scot. Agric., 1950, 29: 205-8.

Deals chiefly with seed potatoes, which are exported from Holland in considerably greater quantities than from Scotland. The operation of the certification scheme, storage of seed potatoes, the regulations governing the control of eelworms and the organized breeding of new varieties are discussed.

1726. BROADBENT, L.
Potatoes and weather.

Quart. J. roy. met. Soc., 1949, 75: 302-9, bibl. 10.

Potatoes thrive best in a cool, humid climate, and during storage they should be protected from extreme

temperatures. "The incidence of diseases to which potatoes are susceptible is largely, if not always directly, dependent upon the weather."

1727. GANDARILLAS, H., AND ARZE, L.
Determinación rápida de la calidad culinaria de la papa. (A rapid method for determination of the cooking quality of [Bolivian] potatoes.) [English summary 10 lines.]

Rev. Agric. Cochabamba, 1949, 6: 5: 51-6, bibl. 1.

The cooking quality (mealiness) of 13 varieties of potato grown in Bolivia was determined by the specific gravity method developed by Clark.* The varieties belonged to several species: *Solanum tuberosum andigenum*, *S. stenotomum megalocalyx*, *S. tenuifilamentum*, *S. ajanhuiri* and *S. juzepczukii*. The average specific gravity of the potatoes studied was 1.104, showing that they contain a higher percentage of starch than the North American varieties. It is thought that this method of determination would be useful for purposes of plant improvement.

1728. BOUCHARD, R. J. A.
Grade quality of Maine potatoes inspected at shipping points for three years 1945-47. Bull. Me agric. Exp. Stat. 476, pp. 31.

A consideration of the different grade defects found and the factors determining them.

1729. KOPETZ, L. M., AND STEINECK, O.
Vergleichende Untersuchungen zur voreilenden Pflanzgutwertbestimmung von Kartoffeln. Der hydroponische Stecklingstest (Augenstecklingsprüfung) und der Wurzelbildtest. (A quick method of evaluating seed potatoes. The development of isolated buds in water culture and a test for the evaluation of root formation.) Bodenkultur, 1949, 3: 487-505, bibl. 20, illus.

In a preliminary communication *Ibid.*, 1949, 3: 107-8; [H.A., 19: 2217] it had been shown that root development is a desirable criterion for the evaluation of seed potatoes. In the meantime the authors have worked out a new technique which shortens the time required for the test. Isolated buds are germinated in moist sand at a temperature of 25° C. and after 8 days they are transferred to a nutrient solution culture. In the solution used, which had given excellent growth with most experimental plants, the nutrients were supplied in the following ratios: K: Ca: Mg=10: 4: 2, N: P: S =12: 4: 3; the minor element content also being specified. After 7 days of water culture differences in the root development of healthy and diseased plants were already obvious, but the tops did not show symptoms for 3-5 weeks, according to variety. Incidentally, it was found that cutting out the bud broke the dormancy, which allowed the tests to be carried out as early as October. In another series of experiments root growth was evaluated according to another method described *Ibid.*, 1948, 2: 161-83 [H.A., 19: 784]. The root picture seen through the blackened bottom of the

jar, in which the seedling is grown in moist sand, clearly shows whether the tuber is healthy or diseased. With this technique it is possible to obtain a result within a maximum of 10 days from the start of the test. Whichever method was used the conclusions drawn from the development of the root were fully confirmed by observations of the top. In nutrient solution culture leaf roll could be diagnosed very early from the pale to yellow colour of the leaves, long before the typical symptoms appeared. The authors found that testing isolated buds in nutrient solution offers many advantages and they hope to improve the method still further.—Hochschule f. Bodenkultur, Vienna.

1730. STEINECK, O.
Die Lichtkeimprüfung von Kartoffelpflanzgut mit Einzelaugen. (Germination tests of seed potatoes from isolated buds.) Bodenkultur, 1950, 4: 44-7, bibl. 5, illus.

When only shoots are required for the evaluation of seed potatoes, isolated buds are germinated in moist sand at a temperature of 25° C. Using this method the test can begin immediately after harvest, by breaking the dormancy with thiocarbamide solution treatment, while after the middle of October the isolated buds germinate without any treatment.

1731. HUSEMANN, C.
Der Einfluss der Humusdüngung auf die Ertragsleistung der Heidesandböden. (The effect of organic manures on yields in sandy heath soils.) Z. Pflernähr. Düng., 1949, 47: 34-53, bibl. 6.

All the trials carried out on a variety of sandy heath soils in north-western Germany show that organic matter supplied as green or stable manure increases yields, but that the full benefit cannot be derived from any such application unless it is supplemented by artificial fertilizers. The importance of copper and lime and of loosening the subsoil is also emphasized. The detailed data submitted include the results of numerous potato trials.

1732. STRUCKMEYER, B. E., AND BERGER, K. C.
Histological structure of potato stems and leaves as influenced by manganese toxicity. Plant Physiol., 1950, 25: 114-19, bibl. 4, illus.

Potato plants grown with 200.5 p.p.m. of manganese were stunted. The upper leaves were chlorotic and the lower ones brittle and dry. Stem streak necrosis had extended to the upper part of the stems. The cells of the epidermis and cortex of the fourth and sixth internode had collapsed and this condition had extended into the ray cells and the pith. The vascular tissue itself was injured only slightly. At a concentration of 50.5 p.p.m. of manganese, the leaves on the lower part of the plant were chlorotic. Stem streak necrosis was apparent on the stem and petiole. The fourth internode showed severe symptoms of manganese toxicity, such as collapse and necrosis of the parenchyma cells. Plants grown at a concentration of 5.5 p.p.m. appeared normal except for the extreme lower part of the plants. The anatomical structure of the fourth internode was normal, whereas the ninth internode showed traces of stem streak necrosis in the epidermis, cortex and

* Clark, C. F., Lombard, P. M., and Whiteman, E. F. Cooking quality of the potato as measured by specific gravity. Amer. Potato J., 1940, 18: 91-9.

phloem. The normal concentration of manganese for growth of potatoes was 0.5 p.p.m. [From authors' summary.]—University of Wisconsin, Madison.

1733. KAR, J.

Bewässerungsversuche im Marchfeld. (*Irrigation trials in Marchfeld, Austria.*)

Bodenkultur, 1949, 3: 559-90, bibl. 30.

In Marchfeld, Austria, where rainfall is below the optimum, sprinkler irrigation proved greatly superior to furrow irrigation for potatoes. For early varieties one application at the time of flowering was found to be sufficient, whereas late varieties benefited from two to three irrigations. Over a 6-year period the average increase in yield resulting from the treatment was 14%, and quality was also shown to be improved. Several applications of sewage water by sprinkler, made during a summer with a relatively high rainfall, produced an increase in yield of 48%. Data are also presented on the effect of sprinkler irrigation on fertilizer requirements.

1734. POTATO PRODUCTION IMPROVEMENT COMMITTEE, ALBERTA.

A guide to potato production under irrigation in Alberta.

Bull. Dep. Agric. Alberta 2, 1950, pp. 10, illus.

A pamphlet for growers briefly describing production from choice of land to harvesting.

1735. SMITH, J. H.

Three methods of picking potatoes. Rates of work output.

Agriculture, Lond., 1950, 57: 11-14.

In harvesting potatoes preparatory to clamping, three methods of picking were compared: (1) picking into baskets and leaving them to be emptied by other workers into tractor-trailers, (2) picking into baskets and emptying the baskets into sacks, (3) picking directly into sacks with the aid of picking belts, as is done in parts of the U.S.A. Although the third method speeded up the actual picking, and the loading of sacks on to trailers was quicker than the tipping of baskets of loose potatoes, the overall speed of clearing a given area was best, and the expenditure of labour least, when the first method with baskets, but without sacks, was used. On the other hand, if potatoes are to be stored in sacks the use of picking belts may be desirable, provided the pickers are men of good physique.—University of Nottingham School of Agriculture.

1736. ELLISON, J. H., AND SMITH, O.

Retarding sprout growth of potato tubers by spraying the foliage with 2,4,5-trichlorophenoxyacetic acid.

Proc. Amer. Soc. hort. Sci., 1949, 54: 447-51, bibl. 5, being *Pap. Dep. Veg. Crops, Cornell Univ.* 315.

Sebago potatoes at Scott, New York, were sprayed in 1947 with the methyl ester of α -naphthaleneacetic acid (MENA) at 3,000 p.p.m., sodium α -naphthaleneacetate (sodium NA) at 500, 1,750 and 3,000 p.p.m., and sodium 2,4,5-T at 50, 175 and 300 p.p.m. Treatments were more effective in reducing sprout growth when applied early, just before blossoming, sodium 2,4,5-T at 50 p.p.m. being the most satisfactory. Higher concentrations of the chemicals injured the crop. With

potatoes in store MENA was slightly more effective than the isopropyl ester of 2,4,5-T when both were applied as dusts; this reversal of the results obtained with foliar sprays is the subject of further investigation. Piercing tubers with toothpicks impregnated with sodium NA and sodium 2,4,5-T had no effect on sprouting.

1737. EMILSSON, B., LILLIEROTH, C. G., AND NILSSON, R.

Användning av gröningshämmande medel vid lagring av matpotatis. I. Försök under lagringssäsongen 1948-1949. (*The control of sprouting in stored ware potatoes. I. Trials during the storage season 1948-49.*) [English summary 1 p.]

J. roy. Swedish Acad. Agric., 1949, 88: 487-506, bibl. 27.

EMILSSON, B.

Användning av gröningshämmande medel vid lagring av potatis. (*The control of sprouting in stored potatoes.*)

Årsb. svensk. Jordbr. Forskn., 1950, pp. 223-30.

Quite satisfactory sprout-inhibition was obtained in all experiments by applying Fusarex at a dosage corresponding to at least 7.5 g. tetrachloronitrobenzene per 100 kg. potatoes. The effect of the treatment appeared to be almost completely independent of the time during the storage season when it was applied. In most cases treatment with sprout-inhibiting chemicals caused a decrease in the loss of weight during storage. This applies especially to Fusarex. The loss through rotted tubers was in most cases decreased by treatment with Fusarex, while the chemicals containing methyl ester did not show any significant effect in this respect. With one exception treated lots of potatoes had a somewhat higher starch content and a considerably larger absolute weight of starch than untreated lots. No significant effect on the cooking quality of the treated potatoes could be established. The influence of storage conditions on the effect of the treatments is discussed. [From authors' summary.]

1738. RHODES, A., AND OTHERS.

Use of isopropylphenylcarbamate to reduce sprouting of potato tubers during storage.

Research, Lond., 1950, 3: 189-90, bibl. 7.

The results of 13 field trials carried out in 1948 indicated clearly that isopropylphenylcarbamate (IPPC) was much superior to methyl α -naphthylacetate (MANA) in reducing sprouting of potato tubers. In field clamps a 1% IPPC dust gave excellent results. As it was found that the effect of treatment decreased gradually with length of storage, it may be possible to use this chemical on seed potatoes, although its primary value is for ware. Toxicity tests must be completed before IPPC can be recommended for use.—I.C.I., Jealott's Hill Res. Stat., Berks.

1739. BURKE, O. D.

Potato diseases and their control.

Circ. Pa. St. Coll. Sch. Agric. 349, 1949, pp. 30, illus.

Twenty diseases are described, and their control is discussed under general control practices, crop rotation, seed selection, spraying or dusting, materials to use, disease-free seed production, seed treatment, and storage.

1740. HAUSCHILD, I.

Epidemiologische Studien. Mathematische Untersuchungen über die Bedeutung der Infektionsresistenz und Toleranz für die Ausbreitung von Infektionskrankheiten und den Befallsgrad natürlicher Populationen unter besonderer Berücksichtigung der Kartoffelviren. (Epidemiological studies. Mathematical investigations into the importance of resistance and tolerance to infection for the spread of infectious diseases and the degree of incidence in natural populations with special reference to potato viruses.)

Biol. Zbl., 1950, 69: 103-47, bibl. 11.

Equations are derived for the spread of disease, making various assumptions on the permanence of an attack, whether it kills plants or not, transmission by propagation, resistance or tolerance, presence or absence of external sources of infection. It is concluded that breeding should be directed towards combining high resistance with low tolerance. J.T.

1741. MEYER, E.

Über den Wuchsstoff-Hemmstoffgehalt gesunder und abbaukranker Kartoffelknollen. (The content of growth- and growth-inhibiting-substances in healthy and virus diseased potato tubers.)

Planta, 1950, 38: 213-32, bibl. 16.

During a 3-year experiment at Göttingen and Münster in Western Germany the total growth substance in diseased potato tubers was found to be 50% lower than in healthy ones. [See also *H.A.*, 17: 771, 772, 895i.] Auxin and heteroauxin make up only a small part of the total growth substance in healthy potato tubers; antiauxin makes up a larger part in healthy potatoes, a smaller one in diseased ones. Besides antiauxin another growth-inhibiting substance(s) is present in both healthy and diseased potatoes, particularly in the diseased ones.

1742. VASUDEVA, R. S., AND AZAD, R. N.

Seed from partially disease-free potato crop.

Indian Fmg., 1949, 10: 433-5.

Pending the large-scale production of certified seed potatoes in India it has been shown in trials over 3 years in two localities that potatoes with a low incidence of virus disease can be produced from commercial seed grown in isolated plots by systematic roguing of plants showing symptoms of severe infection.

1743. VASUDEVA, R. S., AND LAL, T. B.

Production of virus-free seed potatoes.

Indian Fmg., 1949, 10: 485-6.

A note on greenhouse trials designed to isolate virus free plants of the varieties Darjeeling Red Round and Phulwa.

1744. ARENZ, B.

Gefäßversuche über den Einfluss verschiedener Ernährungsweisen auf gesunde und blattrollkranke Kartoffeln. (Pot trials on the influence of nutrition on healthy and leaf roll-affected potatoes.)

Z. PflErnähr. Düng., 1949, 47: 114-31, bibl. 10.

The first year's results of pot and field trials with

healthy and virus-diseased potatoes mainly show the great influence of N on the development of leaf roll. While P and K deficiency made little difference, N deficiency caused an earlier and more severe expression of the symptoms. Again, N was the only nutrient that—supplied in addition to a complete fertilizer—restored the vigour of diseased plants. This regeneration was not confined to a delay in the appearance of symptoms, but was associated with an increase in yield and the restoration of the capacity to flower and fruit which was lost in plants not given extra N. The addition of sulphates gave an even greater effect to the regenerative action of N, while chlorine nutrition, on the other hand, aggravated the disease. Incidentally, it was also observed that diseased seed tubers were still well preserved at harvest time, indicating reduced vigour, whereas healthy tubers were fully used up.—Bayer. Landessaatzuchtanst. Weihenstephan.

1745. BODE, O.

Über den Einfluss der Düngung auf die Ausbreitung der Blattrollkrankheit der Kartoffel: (The influence of fertilizers on the spread of potato leaf-roll.)

NachrBl. Biol. Zentralanst. Braunschweig, 1949, 1: 148-51, bibl. 4.

Potatoes grown on Göttingen University plots were examined at the Institute for Virus Research, Celle, Germany, in a 3-year experiment. Results obtained indicate that KCl commercial fertilizer promotes the spread of leaf-roll disease irrespective of variety.

1746. KÖHLER, E., AND HAUSCHILD, I.

Versuche zur Beeinflussung blattrollkranker Kartoffelknollen durch Chemikalien. (The effect of certain chemicals on tubers of potatoes suffering from leaf-roll.)

NachrBl. dtsh. PflSchDienst, 1950, 2: 24-6, bibl. 6.

None of the applied substances, namely Na_2S , KOH, KMnO_4 , ascorbic acid and cane sugar (as check), showed any therapeutic action against leaf-roll virus.

1747. BARTELS, R.

Über Versuche zur Herstellung eines Antiserums gegen Kartoffel-Blattroll-Virus. (Experiments in the production of potato leaf-roll virus anti-serum.)

NachrBl. dtsh. PflSchDienst, 1950, 2: 38-40, bibl. 6, illus.

The latest experiments with leaf-roll infected potato and *Physalis angulata* foliage were inconclusive. The virus became inactivated in expressed juice. When the virus can be established *in vitro*, the serological test may become promising.—Biological institute, Braunschweig.

1748. BALD, J. G., AND HUTTON, E. M.

Some effects of leaf-roll virus on the development and growth of the potato plant.

Aust. J. agric. Res., 1950, 1: 3-17, bibl. 12.

Detailed studies are described on the effects of the virus on the development, growth and tuber formation in a tolerant potato variety, Up-to-Date, and an intolerant variety, Bismark. Incomplete data suggest that losses in yield through infection are not due to a reduction in efficiency per unit of leaf area, but rather to a reduced growth rate and loss in size of haulm.—C.S.I.R.O.

1749. HUTTON, E. M.

The significance of the necrotic phloem reaction in the potato to the leaf-roll virus. *Aust. J. sci. Res., Ser. B. biol. Sci.*, 1949, 2: 249-70, bibl. 31, illus.

A modified technique which has facilitated the detection of phloem necrosis in leaf-roll-infected potato plants is described. Placed on a quantitative basis, the necrotic reaction has proved valuable in the estimation of leaf-roll severity in varieties and hybrids. Quantitatively, phloem necrosis has been shown to be a varietal character which can be influenced by nutritional and environmental conditions. Among varieties and hybrids, a range of necrotic reactions in the phloem from mild to very severe was found, and these reactions were correlated with external symptoms. Severe reactors show a progressive decrease in the amount of phloem necrosis from the stem base to the tip. It is probable that a severe physiological reaction to leaf roll has a well-defined genetic basis, so that the development of hybrids hypersensitive to this virus is possible. This provides a new approach to the problem of leaf-roll resistance in the potato. [Author's summary.]—C.S.I.R.O.

1750. MATTHEWS, R. E. F.

Studies on potato virus X. I. Types of change in potato virus X infections. *Ann. appl. Biol.*, 1949, 36: 448-59, bibl. 6, illus.

In tobacco plants infected with mild strain of virus X, severe strains may arise as mutations which multiply locally. Several strains of virus X gradually lost infectivity for potato on continued culture in other hosts such as tobacco.—Cambridge Univ.

1751. MATTHEWS, R. E. F.

Studies on potato virus X. II. Criteria of relationships between strains. *Ann. appl. Biol.*, 1949, 36: 460-74, bibl. 19, illus.

Of 10 strains of potato virus X examined, 6 were identical in serological cross-absorption tests, and 2 differed considerably from the others. The possibility of preparing strain-specific antisera is indicated.—Cambridge Univ.

1752. BERCKS, R.

Über das Verhalten verschiedener X-Virus-herkünfte bei Infektionsversuchen an mehreren Kartoffelsorten. (Vorläufige Mitteilung.) (The behaviour of virus-X strain in infection experiments on certain potato varieties. (Preliminary communication).) *NachrBl. biol. Zentralanst. Braunschweig*, 1949, 1: 171-3, bibl. 5.

The negative result given in a previous communication for the attempted artificial infection of the variety Flava with Köhler's x-strain Cs35 in glasshouse experiments in 1948 is confirmed for 1949, both under glass and in the field. Further infection tests with various x-strains on new potato varieties showed differing susceptibility in varieties, and variation in infective power by the virus strains. All new varieties showed "age-resistance".—Biological institute, Braunschweig.

1753. GREGORY, P. H., AND READ, D. R.

The spatial distribution of insect-borne plant-virus diseases. *Ann. appl. Biol.*, 1949, 36: 475-82, bibl. 14.

Data for the spread of rugose mosaic and leaf-roll from point sources in potato crops were fitted as well by the simple empirical expression $\log I = a + bx$ as by the more complex expressions.—Rothamsted Experimental Station, Harpenden.

1754. BALD, J. G., NORRIS, D. O., AND HELSON, G. A.

Transmission of potato virus diseases. VI. The distribution of the aphid vectors on sampled leaves and shoots. *Aust. J. agric. Res.*, 1950, 1: 18-32, bibl. 13.

Data, collected over six seasons, are reported on the distribution on potato plants of the two aphid vectors *Macrosiphum gei* and *Myzus persicae*.—C.S.I.R.O. [see also part V, *H.A.*, 17: 2283].

1755. HEINZE, K.

Zur Übertragung pflanzlicher Viruskrankeheiten durch Blattläuse. (The transmission of virus diseases by aphids.) *NachrBl. dtsh. PflSchDienst*, 1950, 2: 49-53.

Experiments in Celle and Berlin confirmed British work on the transmission of A- and Y- potato virus by *Myzodes persicae*, *Doralis rhamni* and Y-virus by *Macrosiphum solanifolii* and *Doralis frangulae*. New vectors for potato aucuba virus are listed. It is stated that at least 26 aphid varieties are vectors of cucumber mosaic virus; 12 new ones are mentioned.

1756. SYLVESTER, E. S.

Aphid control experiment on potatoes in California—with special reference to the selective action of DDT dusts. *J. econ. Ent.*, 1949, 42: 766-9, bibl. 2.

The 4 insecticidal dusts tested, (1) DDT 5%, sulphur 50%; (2) DDT 5%, heavy oil 2%; (3) parathion 1%; (4) parathion 2%, all gave good control of aphids. Parathion in 1% and 2% concentrations and DDT+oil controlled potato aphid, *Macrosiphum solanifolii* and green peach aphid, *Myzus persicae*, while DDT-sulphur dust was effective only on green peach aphid.

1757. BROADBENT, L., AND OTHERS.

Overwintering of aphids, especially *Myzus persicae* (Sulzer), in root clamps. *Ann. appl. Biol.*, 1949, 36: 513-24, bibl. 4.

Clamps may be a very important source of *Myzus persicae*, the potato aphid. Factors affecting the infestation of clamped mangolds by *M. persicae* were the number of aphids on the crop when lifted, the methods of topping and clamping the roots, and the temperature in the clamp. *M. persicae* was introduced on the leaves, and close topping was often an efficient means of control.—Rothamsted Experimental Station, Harpenden, Herts.

1758. ROUATT, J. W., AND ATKINSON, R. G.

The effect of the incorporation of certain cover crops on the microbiological balance of potato scab infested soil. *Canad. J. Res., Sect. C*, 1950, 28: 140-52, bibl. 16, being *Contr. Div. Bot. Plant Path., Dep. Agric. Canada* 997.

The decomposition of soybean, rye, and red clover in naturally infested potato scab soil resulted in marked quantitative and qualitative changes in the microflora, but only soybean reduced disease incidence. Tubers invariably supported higher numbers of organisms than corresponding soils. When potatoes were grown in the soybean soil, the amino-acid-requiring bacteria were markedly increased on, and correspondingly decreased apart from, the tubers. In contrast, amino-acid-requiring fungi were completely suppressed in the soybean soil. The Bacterial Balance Index showed a relationship with degree of infection, the high index in the soybean soil being associated with least scab. This effect was particularly emphasized in soil on the tubers. [From authors' abstract.]

1759. STAPP, C.

Weitere Untersuchungen über die Resistenz der deutschen Kartoffelsorten gegen *Bacterium phytophthorum* Appel. (Further studies on resistance to black leg in German potato varieties.)

Reprinted from *Phytopath. Z.*, 1950, 16: 202-14, bibl. 6.

Seven potato varieties of the official German list of 1943 proved resistant to *Bacterium phytophthorum* and 18 varieties were fairly resistant. It now seems doubtful whether any relationship exists between yellow flesh colour and susceptibility, as was assumed earlier.—*Biol. Zentralanst. Braunschweig*.

1760. HOOKER, W. J.

A technique for observing tuber enlargement and scab development in potatoes.

Phytopathology, 1950, 40: 390-1, illus.

Using a modified 8-in. clay pot with a 3-in. circular hole cut in the side, inverted over a saucer, and filled with sterile quartz sand to within 1 in. of the lower edge of the lateral hole.

1761. MOROSKY, W. F., AND MUNCIE, J. H.

Effectiveness of certain insecticidal and fungicidal sprays in control of leaf-hoppers, aphids, flea beetles and early blight on potatoes.

Quart. Bull. Mich. agric. Exp. Stat., 1950, 32: 307-10.

Flea beetles and leaf hoppers were controlled equally well with 50% wettable powder or 25% DDT emulsion or an emulsion containing 25% DDT and 3% Parathion. For aphid control, EM 25-3 containing both DDT and Parathion was more effective than either the 50% wettable powder or emulsion of DDT alone. Early blight was more effectively controlled by bordeaux mixture than by the two fixed coppers employed. Total yield, U.S. No. 1 yield, and percentage of U.S. No. 1 grade potatoes were higher in plots sprayed with bordeaux than those receiving fixed copper sprays. [Authors' summary.]

1762. INGOLD, C. T.

Spore dispersal in relation to plant disease and health.

Sci. Progr., 1949, 37: 644-56, bibl. 14.

Although spores of fungi are mainly air-borne, in most cases the distance they fall from the centre of liberation is not great. In parts of U.S. the first infection of potato fields by *Phytophthora infestans* is

due to conidia developing on shoots derived from diseased tubers and old potato refuse piles. A study of the primary infection in a potato field adjoining such a pile showed clearly that the number of primary blight lesions per 100 plants decreased rapidly with distance.

1763. JOHANSEN, G.

Kartoffel-bladpletsyge (*Alternaria solani*).

(Potato early blight.) [English summary 1 p.]

Reprint from *St. plantepat. Fors., Maaned-sov.* 295, pp. 9-13.

A fungus isolated from bronze-coloured, sunken patches of potato tubers was identified as *Alternaria solani*. So far, *Alternaria* conidia have not been discovered on potatoes, though the disease is not uncommon in Denmark. At the end of the storage period 6% of the tubers kept at 1.5-5° C. were found to be affected, while transfer in February to a temperature of 14° C. increased infection to 14%. Experiments on the effect of CO₂ pressure in storage were inconclusive.

1764. ANDRADE, A. C., AND MOREIRA SALLES, J. Pulverização da batatinha. (Potato spraying.)

Biológico, 1949, 15: 187-98.

Trials comparing the effects of bordeaux mixture and Parzate sprays, alone and in combination with DDT and Rhodiatox, on the growth and health of potato crops were carried out at Taubaté in Brazil. Sprays of Parzate+Rhodiatox gave the best results.

1765. MUNCIE, J. H., HATFIELD, M. R., AND MOROSKY, W. F.

Field tests of some new potato fungicides.

Quart. Bull. Mich. agric. Exp. Stat., 1950, 32: 275-8.

Of the spray materials tested, Dithane D-14 and the new G.C.308 (a copper nitrodithioacetate) gave outstanding control. Yield differences were not significant, though yields of plots sprayed with Dithane D-14, G.C.308 and Dow 926 (carbamate+ zinc sulphate) were higher than those of plots sprayed with other materials. Dusting seemed less effective than spraying.—Lake City Experiment Station, Michigan.

1766. GIMINGHAM, C. T., AND THOMAS, I.

Colorado beetle in England, 1949.

Agriculture, Lond., 1950, 57: 134-7.

The precautionary spraying and dusting programme carried out in southern and eastern England on some 28,600 acres in 1949 is outlined.

1767. DUNN, E.

Colorado beetle in the Channel Islands, 1947 and 1948.

Ann. appl. Biol., 1949, 36: 525-34, bibl. 9.

Colorado beetles can survive up to 10 days in sea water and still be capable of flying when the temperature reaches 80° F. (26.67° C.). The beetles that reached the Channel Islands in May 1947 and in May 1948 prove that they can travel across about 30 miles of sea.

1768. BERAN, F.

Auftreten und Bekämpfung des Kartoffelkäfers in Österreich im Jahre 1949. (The appearance and control of Colorado beetle in Austria during 1949.)

PflSch. Ber. Wien, 1950, 4: 11-22.

More stringent control measures resulted in preventing the spread of Colorado beetle and in reduction of infested areas.

1769. SCHWARTZ, E.

Wirkung von Stäubegasol auf Imagines des Kartoffelkäfers. (The effect of DDT dust on the Colorado beetle.)

NachrBl. dtisch. PflSchDienst, 1948, 2: 178-82 [received 1950].

In laboratory trials, in which 2,100 beetles were used, it was shown that DDT dust offers promise for the control of the pest. Although the fatal action is slow, the beetle stops feeding on treated foliage and withdraws from the plant.—Colorado beetle research station of the Biol. Zentralanstalt, Mühlhausen/Thüringen.

1770. CHUN-TEH, CHIN.

Studies on the physiological relations between the larvae of *Leptinotarsa decemlineata* Say and some solanaceous plants. [Dutch Summary 3½ pp.]

Tijdsch. PlZiekt., 1950, 56: 1-88, bibl. 87, illus.

Among other details relative to the feeding habits of the Colorado beetle it is said that its food range is confined to solanaceous plants, which show a gradation from those preferred to those rejected. The plants' odours are the most important factor for eliciting the biting response. *Petunia hybrida* is toxic to the larvae; the third and fourth instars can survive on it only for four days. The mortality rate of the larvae feeding on deadly nightshade (*Atropa belladonna*) is about 50%.

1771. JOHNSON, L. R., AND TOWNSEND, W. N.

The inhibition of hatching of potato root eelworm (*Heterodera rostochiensis* Woll.) in partially sterilized soil.

Ann. appl. Biol., 1949, 36: 504-12, bibl. 9.

The addition of ammonium carbonate to potato root water markedly inhibited hatching of the potato root eelworm when the concentration of ammonia introduced was approximately 100 p.p.m. The strong acid salts of ammonia in equivalent amounts have no such inhibitory effect. The delay of hatching in partially sterilized soil is only effective so long as the ammonia concentration within the soil is maintained at a sufficiently high level. [From authors' summary.]—Leeds University.

1772. FENWICK, D. W.

"Buried bag" technique for testing "D-D" as a soil fumigant against the potato-root eelworm.

Nature, 1950, 165: 694, bibl. 3.

As the mortality in "bagged" *Heterodera rostochiensis* cysts was found to be higher than in "soil" cysts, caution is necessary in the interpretation of results obtained with the "buried bag technique".—Rothamsted Experimental Station.

1773. BECK, K.

Ein Beitrag zur Kenntnis des Kartoffelnematoden, *Heterodera rostochiensis* Wr. (A study of the potato eelworm *H. rostochiensis*.)

NachrBl. dtisch. PflSchDienst, 1948, 2: 183-6, bibl. 12 [received 1950].

Apart from contributions to the biology of the nematode the observation is recorded that in a badly infested potato field less severely affected plants recovered in the late summer, though too late for the tubers to mature.

Tobacco.

(See also 1202, 2161, 2171.)

1774. GARNER, W. W.

Tobacco culture.

Fmrs' Bull. U.S. Dep. Agric. 571, revised 1949, pp. 29, illus., 10 cents.

This bulletin contains detailed information on the areas in which the various types of tobacco are produced in the United States, the varieties grown commercially, and methods of seedbed management, transplanting, fertilizing, cultivating and harvesting the crop practised in each of the more important tobacco growing areas. This is followed by directions for control of the most serious pests and diseases. Finally, there is a short paragraph on seed saving.

1775. COLLINS, J. C.

A survey of the fire-cured tobacco industry [of Southern Rhodesia] conducted during 1949.

Rhod. agric. J., 1950, 47: 14-23, illus.

This article is an abridged version of a report issued by the Standing Fire-cured Tobacco Committee of Southern Rhodesia. The author visited the Shamva-Bindura area during each phase of the crop and here describes soil conditions and methods employed by 23 growers in the following sequence: Soil, seed, rotations, spacing, manuring, cultural methods, pruning and topping, harvesting, tying, curing, grading and presentation for sale.

1776. DE PERALTA, F.

Results of a one-year variety test of cigar filler type of tobacco at Los Baños, Laguna.

Philipp. J. Agric., 1949, 14: 155-46, bibl. 5.

Nine filler type tobacco varieties were compared in a single experiment in the 1938-39 season. Highest yields were obtained from four native varieties in the following order: Simmaba, Vizcaya, Espada, and Repollo. Shorter growth with few standard leaves and significantly lower yields were obtained from two other native varieties, Romero and Pampano, and from three imported varieties, Jamaica, Connecticut and Havana.

1777. SMITH, H. H.

Differential photoperiod response resulting from interspecific gene transfer.

Abstr. in *Amer. J. Bot.*, 1949, 36: 828-9.

The recessive "mammoth" gene of *Nicotiana tabacum* which causes the otherwise day neutral plant to flower only under short photoperiod conditions has been transferred to the species *N. rustica*. After five generations of backcrossing the gene was considered to be in a relatively pure *rustica* germplasm. The "mammoth" segregants in *N. rustica* differed in response to photoperiod from the corresponding type in *N. tabacum* in that they failed to flower after exposure to short photoperiods. This differential response developed gradually during the backcrossing process

and was apparently due to an interaction between the "mammoth" gene and genes in the recurrent parent species. The synthetic "mammoth rusticas" have failed to flower under a wide range of photoperiods. This anomalous type offers interesting material for further investigations on photoperiod response. The genetical significance of the results obtained is discussed.—Cornell University, Ithaca.

1778. HULBARY, R. L.

Structural changes at the shoot apex of tobacco associated with flowering.

Abstr. in *Amer. J. Bot.*, 1949, 36: 797-8.

These investigations were undertaken to determine the time, in ontogeny, of floral initiation, and to observe and measure morphological modifications of the vegetative shoot apex as it changes into an inflorescence. The day-neutral, Little Turkish, variety of *Nicotiana tabacum* L. was grown under ordinary greenhouse conditions at different seasons of the year. The time from planting to floral initiation varied with leaf number and height of stem. It was reasonably constant within any one series of plants. A difference in temperature of 10° F., maintained in two experimental series, affected the time of floral initiation with flower primordia produced earlier in ontogeny at lower temperatures. The shape and zonation of the vegetative apex was modified at the inception of the inflorescence. This modification was accompanied by a more rapid production of lateral floral branch primordia, and a tendency for the apical meristem to be more broadly rounded. The number of tunica layers did not change in the transition to the flowering condition, though other details of histological and cytological change were observed. [Author's abstract.]—State University of Iowa.

1779. ANDERSON, P. J., AND SWANBACK, T. R.
Tobacco seedbeds.

Circ. Conn. agric. Exp. Stat. 175, 1950, pp. 31, illus.

This bulletin describes the preparation and cultural operations of tobacco seedbeds, together with advice on the control of diseases (early damping off, wildfire, downy mildew, bed rots, mosaic or calico, ammonium injury or yellow patch) and insect pests (springtails, cutworms, flea beetles, aphides).

1780. RUSTIA, A.

Prove comparative degli effetti della "jarovizzazione" e dei trattamenti auxinici sulla crescita delle piantine di tabacco. (The effects of vernalization and of growth substances on the growth of tobacco seedlings.)

Tabacco, 1949, 53: 274-82, bibl. 5.

Tobacco seed was submitted to treatment with different strengths of naphthaleneacetic acid and of Rootone, and with mare's urine, and to different temperature treatments, and results were compared. The following conclusions were reached: Seedlings from both vernalized and unvernallized seed showed growth increase resulting from hormone treatments. Ash weight varied according to treatment and not absolutely according to weight of seedling. So far as could be ascertained the treated plants did not eventually prove any taller or heavier than the untreated controls,

but 2 out of 4 vernalization treatments did result in earlier ripening by 8 to 10 days. These treatments were: Exposure of seed to 10°–11° C. and insolation for 10 days and exposure of seed to 13°–14° C. for 11 days under humid conditions.

1781. ANON.

Progress report on tobacco seed bed fumigation with Dowfume MC-2.

Down to Earth, 1949, 5: 2: 14-15.

Summaries are given of the work of several U.S. experiment stations in 1948-49 on the use of methyl bromide to kill weed seeds and soil pests in tobacco seed beds.

1782. RUSTIA, A.

La coltivazione di "Nicotiana Rustica" e prove per aumentarne il contenuto nicotinicco. (The cultivation of *Nicotiana rustica* and methods of increasing its nicotine content.)

Tabacco, 1949, 53: 146-56.

The author deduces from observations of workers in other lands and from trials in Italy that the nicotine content of *N. rustica* presents a problem which is partly genetical and partly environmental. Attempts are to be made from 1949 to select strains for high nicotine content. Later work will be necessary to determine what soils are likely to give the best results not only as regard gross production but for nicotine percentage. All that seems clear at present is the futility of growing the crop on sandy, barren soils.

1783. ASKEW, H. O., AND OTHERS.

Further investigations on the nutrient status of flue-cured tobacco.

N.Z. J. Sci. Tech., Ser. A, 1948, 30: 187-92 [issued March 1950].

Harrison's Special variety of flue-cured tobacco was grown on two soil types for three seasons to determine the course of development of dry matter and of intake of nutrients by the plants. There were distinct differences in chemical composition between leaves and stalks at all stages of growth. The maximum amount of dry matter and of minerals was found shortly after harvesting began. On the heavier soil intake of minerals and nitrogen was such that plants on it generally showed a higher nutrient status than those on the lighter soil. Variations in the chemical composition of cured leaf from successive harvests were apparently due to unidentified seasonal influences. The residual plant material after harvest is of value as green manure.

1784. CIFERRI, R.

Recenti progressi nelle conoscenze sulla nutrizione minerale del tabacco e suoi riflessi pratici. (Practical reflections on recent investigations into the mineral nutrition of the tobacco plant.)

Tabacco, 1949, 53: 215-19.

The author notes the extreme susceptibility of the tobacco plant to environment and nutrition. These factors can affect growth, life, yield and quality. American work has shown the different needs of different types of tobacco for particular nutrients at particular stages. The basic principles involved are here very briefly set out.

1785. STEINBERG, R. A.

Greenhouse tests with chemicals for suppression of lateral branching of decapitated tobacco plants.

Plant Physiol., 1950, 25: 103-13, bibl. 14.

The purpose of the experiments reported here was to obtain data on the comparative effectiveness of some chemical compounds as substitutes for manual suckering of tobacco plants. [For preliminary report of this work see *H.A.*, 17: 1472.] Greenhouse plants of Connecticut Broadleaf (*Nicotiana tabacum*) and Olsen 68 (*N. rustica*) were decapitated and numerous compounds, mostly growth substances, were applied as liquids, powders or crystals to the cut surface of the stem; in a few cases sprays were applied to the stems. Suckering was completely suppressed for a period of 28 days by some of the compounds, and an increase in yield was obtained equal to that resulting from manual suckering. Naphthylacetic acid and its derivatives were usually most effective, and 2,4-D and its derivatives least effective. 2,4-D treatment also resulted in the greatest amount of growth abnormality; in this respect indolebutyric acid and its derivatives were least harmful. Absence of leaves did not interfere with chemical suppression of branching. Spraying the plant stems was relatively ineffective.—*Pl. Ind. Stat.*, Beltsville, Md.

1786. VERONA, O.

Qualche cenno sulle malattie nutrizionali del tabacco. (Notes of nutritional disorders of tobacco.)

Tabacco, 1949, 53: 99-119, bibl. 108.

A survey of relevant work, mainly American, on the deficiency symptoms appearing in tobacco of N, P, K, Mg, Ca, Fe, Mn, S, B and certain other minor elements.

1787. MACINTIRE, W. H., SHAW, W. M., AND ROBINSON, B.

Effects of autoclavings upon the 10-year outgo of nutrients from Cumberland silt loam.

Soil Sci., 1950, 69: 185-91, bibl. 15.

Since the steaming of soils is advocated as an effective procedure for eradicating fungi and nematodes from tobacco-bed soils and for killing weed seeds, a 10-year lysimeter study was conducted to ascertain the effects of autoclave steamings upon immediate and subsequent availability of soil nutrients. From the experiments described "it appears that beneficial effects of the steam treatment of tobacco-bed soils should be attributed solely to the inactivation of fungi and to the killing of weed seeds, rather than to increases in the supply of nutrients, with the single exception of potassium".—*Univ. of Tennessee Agricultural Exp. Stat.*

1788. DIACHUN, S., AND VALLEAU, W. D.

Nicotiana rustica as a source of tobacco streak virus.

Phytopathology, 1950, 40: 128-34, bibl. 9, illus.

Inoculum of high titre was produced consistently by crushing young leaves of *Nicotiana rustica* with M/10 Na_2HPO_4 , containing M/100 Na_2SO_3 , or with M/100 Na_2SO_3 .—*Agricultural Exp. Stat.*, Lexington, Kentucky.

1789. CHESSIN, M.

Effect of host nutrition on properties of tobacco-mosaic virus.

Abstr. in *Northwest Science*, 1950, 24: 1: 29-30.

Work was carried out at Montana State University to determine the cause of a reported inactivation of tobacco mosaic virus as a result of nitrogen deficiency in the host, *Phaseolus vulgaris* var. Early Golden Cluster. No significant differences in size of virus particles were observed between extracts of normal and nitrogen deficient plants. Virus from nitrogen deficient *Nicotiana tabacum* showed consistently lower activity when used to infect *Phaseolus vulgaris* than virus from normal *Nicotiana* plants. No consistent differences in sedimentation rate, homogeneity, molecular volume, or absorption of ultra-violet light could be detected between viruses from nitrogen deficient and normal plants.

1790. UTECH, N. M., AND JOHNSON, J.

The inactivation of plant viruses by substances obtained from bacteria and fungi.

Phytopathology, 1950, 40: 247-65, bibl. 12.

Of 94 species of bacteria and fungi tested, all, as growth products, expressed juice, or water extracts, markedly inactivated tobacco mosaic virus.—*Univ. of Wisconsin, Madison, Wis.*

1791. SCARAMUZZI, G.

Il "seccume concentrico" alterazione batterica di carattere epidemico del tabacco. (An epidemic disease of tobacco caused by *Bacterium tabacum*.)

Tabacco, 1949, 53: 242-54, bibl. 31.

This disease which resulted in very serious losses in Italy in Kentucky tobacco but not in Burley in recent years is identified as wildfire. Its symptoms are described and illustrated. Their appearance would appear to depend indirectly on weather conditions and directly on low topping and excessive nitrogenous manuring.

1792. MARUDARAJAN, D.

Note on *Orobancha cernua* Loeffl. [on tobacco].

Curr. Sci., 1950, 19: 64-5, bibl. 1, illus.

O. cernua var. *desertorum* is a common root parasite of tobacco and has been found parasitizing other solanaceous plants. However, certain plants, including *Capsicum annuum*, stimulate germination of *Orobancha* seeds without being parasitized themselves and the *Orobancha* seedlings thus die for lack of a host. It is suggested that tobacco be grown on a 3-year rotation, preceded by a chilli crop.

1793. KULASH, W. M.

The green peach aphid as a pest of tobacco.

J. econ. Ent., 1949, 42: 677-80.

Myzus persicae has become a pest of field-grown tobacco in North Carolina during the last few years. Of 10 insecticidal formulations used in control tests in 1948, 1% tetraethyl pyrophosphate in aerosol form gave the most rapid kill of aphids, but had no residual effect. 1% parathion dust also gave very rapid control and had a good residual effect. Improvements in methods of application are necessary before aerosols can be used economically for aphid control on tobacco.

Observations on natural control of the pest are recorded.
—N.C. agric. Exp. Stat., Raleigh.

1794. FOX, C. J., AND OTHERS.

The chemical control of the tomato hornworm on tobacco in Ontario.

Sci. Agric., 1949, 29: 553-62, bibl. 8.

Field experiments on the control of the tomato hornworm on tobacco were carried out over a period of 5 years. Nine different insecticides were tested, DDT proving much the most effective.—Dominion Entomological Lab., Chatham, Ontario.

1795. COON, B. F.

Insecticides for Pennsylvania tobacco.

Prog. Rep. Pa agric. Exp. Stat. 26, 1950, pp. 8, bibl. 14.

Recommendations are given for the control of flea beetle, aphid, hornworm, cutworm and wireworm. Concentrations of various seedbed insecticides per 100 gal. of spray solution which show no injury to plants were: chlordan 50% wettable powder, 2 lb.; DDD, 50% wettable powder, 2 lb.; parathion, 25% wettable powder, $\frac{1}{2}$ lb.; tetraethyl pyrophosphate, 20% liquid, 1 pt.; DDT, 50% wettable powder, 2 lb.; BHC, 6% gamma isomer, 2 lb. The application of the insecticides did not affect yield or percentage of wrappers. Precautionary measures are given for the use of parathion and of tetraethyl pyrophosphate.

Drug plants.

1796. HOFFMANN, F. H.

Über den Einfluss einiger Bodenarten auf Wachstum und Gehalt von Arzneipflanzen. (The effect of certain soil types on growth and composition of medicinal plants.)

Ber. schweiz. bot. Ges., 1949, 59: 285-408, bibl. 134.

Two ethereal oil plants, *Peucedanum ostruthium* and *Artemisia laxa*, one arbutin and tannin plant, *Bergenia delawayi*, and two alkaloid plants, *Atropa belladonna* and *Lobelia inflata*, were grown at the experimental garden at Adlisberg, near Zürich, where 9 Swiss soil types lie in close proximity, thus eliminating the climate factor. Analyses were also made of plants of the same species growing in their natural habitats. The following are some of the conclusions drawn from the extensive data assembled over a period of years: (A) *Ash content*: (1) *Belladonna* leaves are richer in ash content than *belladonna* roots. As a rule, soils with a medium calcium content produce deadly nightshade roots with a high ash content, while roots with a low ash content come from either high or low calcium soils. (2) In *P. ostruthium* rhizomes and stolons with a high ash content are also associated with soils of a medium calcium content, while no such relationship exists in the case of *A. laxa*. (B) Although it is not always possible to attribute variations in the content of active substance to certain soil factors, the following relationships were generally found to exist: (1) A high calcium content adversely affects alkaloid formation in *belladonna* roots, ethereal oil formation in *A. laxa* and arbutin and tannin formation in *B. delawayi*, but in *P. ostruthium* the ethereal oil content becomes greater in high and medium high calcium soils. (2) Alkaloid formation in *A. belladonna* and *L. inflata*

is favoured by a high N content of the soil; but no relationship exists between N content and the other medicinal substances in the other plants. (3) A high soil P_2O_5 content is associated with a higher range of alkaloid content in *belladonna* roots and *lobelia*, while it has the opposite effect on the ethereal oil content of *P. ostruthium* and the content of bitter agents in *A. laxa*. (4) A high content of easily soluble potash seems to be favourable to alkaloid, arbutin and tannin formation but unfavourable to the formation of bitter agents in *A. laxa*. (5) No relationship was found to exist between soil pH and plant composition. The results obtained show the very considerable influence of soil type on the active agent content in medicinal plants—differences of 80% were observed—and their application under Swiss conditions is discussed.

1797. ENTRES, K.

Staatlich Förderung der Arzneipflanzenkultur in Österreich. (State support for medicinal plant cultivation in Austria.)

Bodenkultur, 1950, 4: 103-6.

The cultivation of medicinal plants is once more officially encouraged in Austria.

1798. SHAH, S. M. I.

Artemisia in North-west Frontier province.

Agric. Pakistan, 1949, 1: 39.

Two new strains of *Artemisia*, viz. B/3 and B/9, are mentioned as having yielded 3.17% and 4.24% of santonin respectively. Further work on selection and breeding is in progress.

1799. BEER, A. A., AND OTHERS.

A chemical study of *Colchicum speciosum* Stev. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1949, 67: 883-4.

An analytical study of the corm of *Colchicum speciosum* with special reference to the extraction and purification of colchicine. A new alkaloid extracted is named kolhicerin (colchicerine) by the authors.

1800. NIGAM, R. G. S., PANDYA, K. C., AND TAYAL, J. N.

Chemical examination of the seeds of *Luffa graveolens* Roxb. and *Luffa echinata* Roxb.

Curr. Sci., 1949, 18: 451, bibl. 5.

Seeds of the two *Luffa* species, reputed to possess medicinal properties, yielded 11.6% and 11.14% oil respectively. Chemical analyses of the oils are tabulated.

1801. RODWELL, C. N.

Rutin in two eucalypts.

Nature, 1950, 165: 773, bibl. 7.

Young leaves from mature trees of *E. macrorrhyncha* contained an average of 15% rutin; older leaves and coppiced growths contained less. Comparable yields were obtained from *E. youmani*, but no rutin was found in *E. dives*, *E. capitellata*, *E. muelleriana*, *E. eugenoides*, *E. obliqua* and *E. tinghaensis*.—Div. Pl. Ind. C.S.I.R.O., Australia.

1802. MODOR, V.

Leonuri lanati herba. (*Leonurus lanatus*.) [French and Russian summaries.]

Bull. Hungarian agric. Exp. Stat., 1947, 47/49: 27-30 [received 1949].

Before the war *Leonurus lanatus* [Labiatae] almost died out in Hungary. In 1940 the Medicinal Plant Experimental Institute in Budapest obtained seeds from Moscow, and is now successfully growing and propagating it. The climatic and soil conditions of Hungary are suitable for the cultivation of this herb. The plant grows 6-20 inches high, is perennial and the aerial parts supplying the drug are collected at the time of flowering.

1803. IVAŠENJKO, A. A.

Vegetative segregation in mint. [Russian.]
Agrobiologija (Agrobiology), 1949, No. 4,
p. 118.

In breeding experiments at the Ukrainian experimental station for ornamental plants, out of 10,000 peppermint [*Mentha piperita*] seedlings one was selected (No. 541) which contained more essential oil than black pepper [*Piper nigrum*]. Variety 541 when propagated by division, gave rise to sports, some of the parts producing plants similar to 541, others to a "blue mint". The latter yielded much less essential oil than the plants with the "541" characters.

1804. PRASADA, R., AND CHOTHIA, H. P.

Studies on safflower rust in India.
Phytopathology, 1950, 40: 363-7, bibl. 6.

Puccinia carthami has been seen near Delhi on the cultivated safflower, *Carthamus tinctorius*, and on *C. oxyacantha*, a wild species. Teliospores from the wild species may infect the cultivated species directly or may attack the wild species first.—Indian Agric. Res. Inst. New Delhi, India.

Fibres.

1805. HAARER, A. E.

Why not grow fibre?
Fruitgrower, 1950, 109: 361-2.

New Zealand hemp (*Phormium tenax*) is the one hard fibre plant that will grow in a temperate climate. It grows vigorously as an ornamental plant in this country, and attempts have even been made to grow it on a commercial scale. These failed, not because of the unsatisfactory growth of the plant, but because of the low prices paid for hard fibre in pre-war years. Now that prices have risen considerably, and machinery can be used to reduce labour costs, the author suggests that New Zealand hemp might be a profitable crop in England. It can be grown satisfactorily on marshy land or steepish hillsides, where it could be used both to prevent erosion and to utilize land that could not otherwise be cropped. Once a plantation is established, little labour is needed for maintenance. Brief notes are given on planting and harvesting. There is much variability in the wild species, and for commercial purposes it would be necessary to select and propagate from a good uniform clone.

Rubbers.

(See also 2173.)

1806. KROTKOV, G.

Changes in the carbohydrate metabolism of *Taraxacum kok-saghyz* Rod. during the first and second years of growth.
Plant Physiol., 1950, 25: 169-80, bibl. 11.

As the synthesis of rubber in *Taraxacum kok-saghyz* was thought to be intimately connected with its carbohydrate metabolism, it is probable that a knowledge of the latter would be valuable in elucidating the factors affecting the synthesis of rubber. It would also be valuable in the industrial utilization of kok-saghyz roots as a source of carbohydrates. For these reasons a systematic study was made of the carbohydrate metabolism of this plant. It was found that the bulk of the carbohydrates in kok saghyz occurs in the roots. "During the growing season alcohol-soluble carbohydrates predominate in leaves, while alcohol-insoluble ones are characteristic of roots. The alcohol-insoluble carbohydrates of roots consist mainly of levulins similar to those described for guayule. Inulin is present only in small amounts. In roots large amounts of sugars appear toward the end of the growing season, and large amounts of the alcohol-insoluble carbohydrates disappear at the beginning of the summer and winter rest periods. This appearance of sugars or disappearance of the alcohol-insoluble carbohydrates is not due to the mutual transformations of these two fractions. They involve some other substance or substances, whose chemical nature is unknown at present."—Queen's University, Kingston, Ontario.

1807. BENEDICT, H. M., BROOKS, P. M., AND
PUCKETT, R. F.

The molecular weight of rubber in different parts of the guayule plant.

Plant Physiol., 1950, 25: 120-34, bibl. 8.

This paper describes a routine procedure developed for the extraction, fractionation and estimation of the molecular weight of rubber found in guayule. By the use of this technique, it was found that the molecular weight of the rubber differs in various parts of the plant, being highest in the roots and progressively lower in the stems, branches and tips of the shoots. The highest molecular weight estimate obtained for any fraction of guayule rubber was not so high as some weights reported for hevea rubber.—Rubber Research Field Station, Salinas, Calif.

Noted.

1808.

a ANON.

New sweet corn, Golden Freezer Hybrid 8736.

Seed World, 1950, 66: 9: 34.

Very suitable for freezing and canning.

b BEHR, L.

Ameisenschaden an Kohlrabi. (Ant damage to kohlrabi.)

NachrBl. dtsh. PflSchDienst, 1948, 2: 212-13, bibl. 4 [received 1950].

By feeding on the roots of seedlings.

c BERCKS, R.

Die Bedeutung der Serologie für Erforschung und Bekämpfung der Kartoffelviren. (The significance of serology in the investigation and control of potato viruses.)

NachrBl. dtsh. PflSchDienst, 1950, 2: 6-8, ill.

A general review.

- d BERCKS, R.
Serologische Untersuchungen über das X-Virus in Kartoffelpflanzen. (Serological investigations on the X-virus in potato plants.)
Reprinted from *Phytopath. Z.*, 1950, 16: 71-85, bibl. 7.
- e BERGER, C. A., AND WITKUS, E. R.
Further studies of the cytological effects of combined treatments with colchicine and naphthaleneacetic acid [on roots of *Allium cepa*].
Abstr. in *Amer. J. Bot.*, 1949, 36: 794-5.
- f CLAASSEN, C. E., AND HOFFMAN, A.
The inheritance of the pistillate character in castors and its possible utilization in the production of commercial hybrid seed.
Agron. J., 1950, 42: 79-82, illus.
- g DICKSON, R. C., AND OTHERS.
Insect vectors of cantaloupe mosaic in California's desert valleys.
J. econ. Ent., 1949, 42: 770-4, bibl. 8.
- h EDELMAN, J., AND BACON, J. S. D.
The action of an enzyme preparation from *Helianthus tuberosus* L. (Jerusalem artichoke) on carbohydrates present in the tubers.
Biochem. J., 1949, 45: xxix, bibl. 4.
- i FRAZIER, W. A., AND DENNETT, R. K.
Isolation of *Lycopersicon esculentum* type tomato lines essentially homozygous resistant to root knot.
Proc. Amer. Soc. hort. Sci., 1949, 54: 225-36, bibl. 12, being *Tech. Pap. Hawaii agric. Exp. Stat.* 188.
- j FRAZIER, W. A., AND DENNETT, R. K.
Tomato lines of *Lycopersicon esculentum* type resistant to tobacco mosaic virus.
Proc. Amer. Soc. hort. Sci., 1949, 54: 265-71, bibl. 10, being *Tech. Pap. Hawaii agric. Exp. Stat.* 186.
- k FULTON, R. W.
Cross protection tests with cucumber viruses 3 and 4 and tobacco mosaic virus.
Phytopathology, 1950, 40: 219-20.
- l FULTON, R. W.
Variants of the tobacco necrosis virus in Wisconsin.
Phytopathology, 1950, 40: 298-305, bibl. 11, illus.
- m GINSBURG, J. M., AND OTHERS.
Recovery of parathion, DDT and certain analogs of dichlorodiphenyl-dichloroethane from treated crops [including peas and potatoes].
J. econ. Ent., 1949, 42: 602-11, bibl. 30.
- n GORRISS, H. R.
Tobacco blue mold [*Peronospora tabacina*] control.
Ext. Circ. N.C. agric. Ext. Serv. 348 (A), 1950, pp. 11.
Proprietary substances Ferbam and Zineb recommended.
- o HEINZE, K.
Die Unterscheidungsmerkmale der Kartoffelblattläuse und die Bedeutung der einzelnen Arten als Virusüberträger. (The distinguishing characters of potato aphids and the significance of individual species as virus vectors.)
NachrBl. dtsh. PflSchDienst., 1948, 2: 205-11, bibl. 7, illus. [received 1950].
- p JENKINS, J. M., JR., AND COVINGTON, H. M.
Growing lettuce in North Carolina.
Ext. Circ. N.C. agric. Ext. Serv. 349, 1950, pp. 4.
- q KRAMER, A., GUYER, R. B., AND IDE, L. E.
Factors affecting the objective and organoleptic evaluation of quality in sweetcorn.
Proc. Amer. Soc. hort. Sci., 1949, 54: 342-56, bibl. 12, being *Sci. Publ. Md agric. Exp. Stat., Dep. Hort.* A.242.
- r McDONALD, H.
Cutworms. [Especially 7 species attacking vegetables and flowers.]
Processed Publ. Ser., Ent., Dep. Agric., Ottawa. 81, 1948, pp. 7.
- s MAHMUD, K. A.
Damping-off of cabbage, cauliflower and knolkohl caused by *Pythium aphanidermatum* (Eds.) Fitz.
Curr. Sci., 1950, 19: 67-8, illus.
- t MINISTRY OF AGRICULTURE, LONDON.
Leeks.
N.A.A.S. Adv. Leaflet. 359, 1950, pp. 2.
- u NYLUND, R. E.
Ascorbic acid content of twenty-five varieties of the rutabaga (*Brassica napobrassica*).
Proc. Amer. Soc. hort. Sci., 1949, 54: 367-72, bibl. 10, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* 2460.
- v RICK, C. M.
Rates of natural cross-pollination of tomatoes in various localities in California as measured by the fruits and seeds set on male-sterile plants.
Proc. Amer. Soc. hort. Sci., 1949, 54: 237-52, bibl. 9.
- w SCHÖNBERG, A., AND SINA, A.
Khellin and allied compounds.
J. Amer. chem. Soc., 1950, 72: 1611-16, bibl. 13.
Khellin, used in medicine, is obtained from fruits of *Ammi visnaga* (L.).
- x SHOWALTER, R. K., AND SCHOMER, H. A.
Temperature studies of commercial broccoli and sweet corn prepackaging at the shipping point.
Proc. Amer. Soc. hort. Sci., 1949, 54: 325-9, bibl. 2.
- y SMALL, J.
Parsley seed.
Food, Lond., 1949, 18: 268-70, illus.
History, uses and chemical composition.

- z STAPP, C., AND MARCUS, O.
Untersuchungen über Vorkommen und
Nachweis serologisch differenter Y-Viren
der Kartoffel. (Occurrence and demon-

stration of types of Y virus in the potato
differing serologically.)
Reprinted from *Phytopath. Z.*, 1950, 16:
215-26, bibl. 23.

FLORICULTURE.

General.

(See also 1266, 2147, 2153, 2170.)

1809. AMMANN, G.
Die Entwicklung der Gartengestaltung von
1900-1950. (Development of landscape
gardening from 1900 to 1950.)
Gärtnerteister, 1950, 53: 1-11, illus.
A well-written article with numerous illustrations and
plans.

1810. EVANS, A.
The peat garden. A possible solution to
the northern slope.
J. roy. hort. Soc., 1950, 75: 145-55, illus.
The making of a peat garden, with its very special
requirements and interesting possibilities, may appeal
to many enterprising gardening enthusiasts. A. Evans,
of the Royal Botanic Garden, Edinburgh, here discusses
the construction and planning of such a garden, and,
to illustrate the range of suitable plant species, he gives
an account of the plants that may be seen in the peat
garden at Edinburgh at various times of the year.

1811. NILSSON, A.
Örtartade två- och fleråriga prydnadsväxters
förmåga att uthärda stränga vintrar. (The
winter hardiness of biennial and perennial
herbaceous ornamental plants [in Sweden].)
[English summary 1 p.]
Agri hort. Genet., 1949, 7: 29-78, bibl. 35.
The severe winters of 1941/42 and 1946/47 caused
heavy losses in Sweden among herbaceous ornamentals.
Questionnaires were sent out to nurserymen in different
parts of the country with the request to specify the
damage sustained. The result of the enquiry is a long,
fully annotated list of plant names, arranged in alpha-
betical order of the genus, in which the extent of the
injury is indicated by a figure (from 10 to 0). Other
symbols and abbreviations, which are explained in the
English summary, give details on locality, area, the
protective covering used, etc. The survey reveals
again that winter hardiness is a valuable criterion for
selection of ornamentals for raising in Swedish
nurseries.

1812. CLARK, V. L., AND OTHERS.
The cold resistance of certain species of
herbaceous perennials.
Proc. Amer. Soc. hort. Sci., 1949, 54:
469-72, bibl. 3, being *Pap. sci. J. Ser. Minn.*
agric. Exp. Stat. 2465.
Subjecting potted plants to controlled low temperatures
at St. Paul, Minnesota, indicated that the "danger
points" and "killing temperatures" for the species
studied were: *Lychnis chalcidonica*, 16° and 5° F.;
Penstemon secundiflorum, 16° and 5° F.; *Althea rosea*,
21° to 16° F. and 10° F. The species studied did not
appear to gain in cold resistance during the winter.

1813. MOORE, W. C., AND MOORE, F. J.
New and interesting plant diseases.
Trans. Brit. mycol. Soc., 1949, 32: 273-9,
bibl. 20.

In continuation of this series of notes on plant diseases
[*H.A.*, 19: 979] descriptions are given of the following:
37. Two powdery mildews on rock rose (*Leveillula*
taurica and another mildew not identified). 38. Downy
mildew of rock rose (*Peronospora leptoclada*). 39.
Powdery mildew on cherry laurel (*Oidium* sp.). 40.
Alternaria stem blight of godetia (*Alternaria godetiae*).
41. Stem rot of melon (*Mycosphaerella citrullina*).—
Plant Pathology Laboratory, Harpenden.

1814. KIRBY, R. S., AND PEPPER, J. O.
Diseases and insects of the flower garden
and their control.
Circ. Pa St. Coll. Sch. agric. Ext. Serv.
347, 1949, pp. 29, illus.

The diseases and pests of 17 flower garden plants are
described with notes on general insects and diseases
(viz. cutworms, white grubs, grasshoppers, slugs, and
damping-off), and a dilution table for spray materials.

1815. RUNGS, C.
Observations préliminaires sur deux hymén-
optères *Tenthredinidae* nuisibles aux cul-
tures florales au Maroc. (Preliminary
observations on two hymenopterous insects
damaging flowering plants in Morocco.)
Repr. Rev. Path. vég. Ent. agric. Fr., 1949,
28: 170-4.

Descriptions of *Athalia cordata*, a pest of snapdragon
(*Antirrhinum majus*) and *Protemphytus pallipes*, which
attacks violets (*Viola odorata*).

1816. PRITCHARD, A. E., BEER, R. E., AND
ROSENSTEIL, R. G.
The omnivorous leaf tier on field-grown cut
flowers in California.
J. econ. Ent., 1949, 42: 845-6.

The omnivorous leaf tier, *Cnephasia longana* (Haw.)
first seen in California in 1948, attacked various flowers,
particularly composites. During an experiment on a
ten-acre field of asters, parathion, DDD and DDT
sprays gave good control. Plants sprayed with
parathion suffered some injury.

1817. TOMPKINS, C. M.
Botrytis blight of bouvardia flowers.
Hilgardia, 1950, 19: 399-400, illus. (pp.
407-8).

The blight, caused by *Botrytis cinerea*, is prevalent on
cut flowers of *B. humboldtii* Hort. var. *grandiflora*
when these are stored in waxed containers in commer-
cial refrigerators at 48° F. in San Francisco. The
disease can be controlled by spraying the flowers with
1:800 copper oleate solution immediately after
packing.

1818. DIMOCK, A. W.

Major carnation diseases and their spread.

Flor. Exch., 1950, 114: 12: 21, 72.

Symptoms, spread and possible methods of control are given of the following diseases: rhizoctonia stem rot, alternaria blight, fusarium wilt and bacterial wilt.

1819. DIMOCK, A. W., AND FORD, C. H.

Parathion controls leaf nematode disease of chrysanthemums.

Bull. N.Y. St. Flower Gr., 1949, No. 50, p. 8.

The good control achieved with parathion spray in the United States was confirmed by similar results in Holland, Germany and Norway.

1820. GREEN, D. E., AND HEWLETT, M. A.

A leaf spot disease of cineraria (*Senecio cruentus*) new to Great Britain.

J. roy. hort. Soc., 1950, 75: 199-202, bibl. 3, illus.

Some further details are given of the recently observed fungus disease of cinerarias [see *H.A.*, 20: 965]. The causal fungus is *Alternaria senecionis*.

1821. WETMORE, R. H., AND MOREL, G.

Growth and development of *Adiantum pedatum* L. on nutrient agar.

Abstr. in *Amer. J. Bot.*, 1949, 36: 805-6.

Small pieces of the apical meristem of the rhizome of the maidenhair fern will grow to maturity on Gautheret's medium supplemented with 10⁻⁷ or 5 × 10⁻⁸ naphthaleneacetic acid and 2% glucose. Higher concentrations of NAA tend to slow down growth and reduce vigour. Apices were also grown satisfactorily on Gautheret's medium supplemented with yeast extract (0.5 g. per l.), malt extract (0.5 g. per l.) or B-vitamin mixtures. Those grown on yeast extract grew faster and were sturdier than the others. In the other 2 cases, an auxin in low concentration proved beneficial in the early stages of development.—Harvard University, Cambridge, Mass.

1822. FAVARGER, C.

Contribution à l'étude caryologique et biologique des Gentianacées. (A cytological and biological study of the genus *Gentiana*.)

Ber. schweiz. bot. Ges., 1949, 59: 62-86, bibl. 23.

Out of 12 species studied 10 are polyploid and 2 diploid, the basic chromosome numbers being $x=5$ and $x=7$. In 3 species it was shown that flower bud formation takes place in the autumn.

1823. STEYER, M., AND HALLER, E.

Gutachten für zwei neue Gloxinien-Sorten. (Two new gloxinias.)

Gärtnerteilnehmer, 1949, 52: 358, illus.

A description of two new Swiss gloxinias, Volpps Symphonie and Volpps Merveille.

1824. MEAHL, R. P., LITTLE, L. D., AND ATMORE, S.

1949 Trials of annual flowers at the Pennsylvania State College.

Marigold and zinnia trials 1949.

Petunia trials 1949.

Progr. Repts. Pa agric. Exp. Stat. 21, 22, 23, 1950, pp. 29, 7 and 13 respectively.

Details are given of the characters and growth of named varieties raised from seed of well known firms and cultivated in the Pennsylvania State College Test Garden in 1949.

1825. ROTOR, G., JR.

Orchid research.

Flor. Exch., 1950, 114: 15: 17.

Results of studies indicate that bud formation is closely associated with daylength and temperature, while general growth is largely dependent on temperature alone. A new method of vegetative propagation of *Phalaenopsis* has been worked out. The eyes of the flower stalk are planted on an agar medium; leaves are produced within 2-3 weeks, roots appear after 5 months, when the plant may be transplanted into pots. It is expected to flower within 1-2 years.

1826. ROTOR, G., JR.

Vegetation propagation of *Phalaenopsis*.

Bull. N.Y. St. Flower Gr., 1949, No. 51, p. 4, bibl. 2, illus.

A new, simple and practical method of vegetative propagation of *Phalaenopsis* orchids from flower stalks is described from Cornell University.

1827. RICHARDSON, H. H.

Methyl bromide fumigation of imported orchid plants.

J. econ. Ent., 1949, 42: 650-2, bibl. 3.

Observations were made on 72 importations of orchid plants to determine whether the methyl bromide fumigation, required as a condition of entry into the United States, caused reduction in quality. Good and poor quality shipments of dormant, semi-dormant and actively growing plants were represented. Fumigation caused no reduction in quality, except in 2 poor quality shipments of *Cattleya gigas* fumigated in a 15-inch vacuum. Vacuum fumigation gave complete control of the orchid fly (*Eurytoma orchidearum*), leaf-mining insects, and a lepidopterous borer (*Castnia* sp.).—U.S.D.A. Bur. Ent. Pl. Quar.

1828. TSAO, T.-H.

Some physiological and biochemical changes accompanying pollination in orchid flowers.

III. Respiration and catalase activity.

Abstr. in *Amer. J. Bot.*, 1949, 36: 829.

The rate and respiration and catalase activity of orchid flowers was approximately doubled within a few hours of pollination. There was no alteration in respiratory quotient. Stimulation of respiration usually preceded an increase in the fresh weight of the tissue, which in turn preceded an increase in dry weight. The chain of reactions occurring in the column of a pollinated flower is considered to be as follows: increase in catalase activity; stimulation of respiration; acceleration of water uptake; increase in uptake of inorganic salts and mobilization of sugars; increase of hydrophilic colloids; increase in osmotic pressure. 0.5% naphthaleneacetic or indoleacetic acid applied to the stigma produced a qualitative effect similar to that of pollination. The auxin effect, however, did not persist, while the pollen effect showed a progressive increase. This appears to substantiate the theory that pollen does not supply the entire source of auxin for continued embryo development, and that more auxin

is formed or released as the process proceeds.—University of Wisconsin, Madison.

1829. VACIN, E. F., AND WENT, F. W.

Use of tomato juice in the asymbiotic germination of orchid seeds.

Bot. Gaz., 1949, 111: 175-83, bibl. 13.

It is shown that tomato juice-agar solutions supplemented with sucrose are better media for the asymbiotic germination of orchid seeds than the synthetic culture media containing only sugar and salts (Knudson's solutions B and C) generally used. Germination was more rapid and growth stronger. Within the pH range for good growth (pH 4.5-5.5) these tomato juice solutions are buffered about 50 times as strongly as solution C; moreover, the pH values in the good growth range were not altered by autoclaving. By ashing the tomato juice solutions it was found that organic rather than inorganic compounds were responsible for the enhanced growth. A protein hydrolysate, rich in amino acids and vitamins, added to the inorganic solutions, allowed more rapid growth than even the tomato juice media. Concentrations of protein-hydrolysate greater than 1%, however, are toxic to *Cymbidium* embryos. In general, on organic culture media, the protocorms failed to differentiate, only increasing in size. When these undifferentiated protocorms were transplanted into pots containing osmunda fibre, however, they differentiated quickly and produced sturdier seedlings than those developed on inorganic-plus-sugar media, and the mortality rate due to transplanting was lower. It is estimated that the use of a 1% protein hydrolysate medium for the culture of *Cymbidium* seedlings reduces the period of sterile culture by about 6 months.—Calif. Inst. Technology, Pasadena.

1830. TOMPKINS, C. M., AND HANSEN, H. N.

Pansy leafspot, caused by *Centrospora acerina*, host range, and control.

Hilgardia, 1950, 19: 383-98, bibl. 14, illus.

Pansy leafspot has been prevalent in the San Francisco Bay region since 1928, developing in the cold, wet winter months. Symptoms and greenhouse infection experiments with many plants are described. Excellent control is obtained by frequent spraying during the rainy season with 1 to 800 copper oleate solutions, not only on pansies and violas, but on other susceptible ornamental bedding plants, which are listed, and on certain susceptible vegetables, notably lettuce, French endive, and narrow-leaf dandelion. The roots, but not the leaves, of parsnips are also attacked.

1831. ANDREIČENKO, K. I.

Perennial phlox in Siberia. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 68-9.

Perennial phlox can be grown successfully in Siberia, with a sequence of flowering from the middle of July until the snow falls. Suitable early, midseason, and late varieties are named. As they do not always breed true from seed, soft wood cuttings are recommended for propagation.

1832. S., W. F.

Pyrethrums pay well in small doses.

Grower, 1950, 33: 531-3.

Notes on varieties grown for cut flowers, their propagation, cultivation and marketing.

1833. ANON.

Saintpaulia ionantha grandiflora "Blaues Märchen". (A new saintpaulia.)

Gärtnermeister, 1950, 53: 34, illus.

Seedlings of *Saintpaulia ionantha grandiflora* var. blue fairytale, keep their medium blue colouring. The plant is fast growing, with dark green leaves and good flowers.

1834. ABBISS, H. W.

Violets like a strawberry soil.

Grower, 1950, 33: 720-1.

The article includes recommendations on soils, manuring, irrigation, spacing, cultivation, control of diseases, and pests (notably red spider), winter protection of double violets, harvesting and bunching. In Devon and Cornwall the almost scentless but red spider resistant Governor Herrick is the variety most widely grown, but Princess of Wales is superior; other varieties are mentioned briefly.

1835. HOPKINS, J. C., AND DOWSON, W. J.

A bacterial leaf and flower disease of *Zinnia* in Southern Rhodesia.

Trans. Brit. mycol. Soc., 1949, 32: 252-4, bibl. 5, illus.

An angular leaf spot is attributed to *Xanthomonas nigromaculans* forma specialis *zinniae* f.n.sp. which is briefly described.

Bulbs, tubers, etc.

1836. YODER, D. M.

Bulb diseases.

Bull. N.Y. St. Flower Gr., 1949, No. 49, pp. 4-5.

Mersolite 8 at 1 lb. to 800 gallons as a 5-minute dip has given good control of narcissus basal rot [*Fusarium bulbigenum*] in a series of experiments at Cornell University. Botrytis fire of tulips was controlled with silver nitrate, Dithane D-14 and other materials, though none gave complete control. Best control of fusarium rots and yellows disease of gladiolus was given by N.I. Ceresan or corrosive sublimate dips, and Arasan applied as dust. Experiments with Botrytis leaf spot and corm rot of gladiolus have shown that there is no correlation between the amount of leaf spotting in the field and the amount of Botrytis corm rot that will develop in storage. Foliage can be protected from Botrytis by weekly sprays of Dithane D-14 or Parzate.

1837. ABBISS, H. W.

Anemones flourish on lime and good drainage.

Grower, 1950, 33: 468-9.

An account of methods used in south-west England, including notes on varieties, soils, manuring, propagation by seed and corms, irrigation, picking and packing.

1838. GREGORY, P. H.

Leaf diseases of *Anemone coronaria* in Cornwall.

Trans. Brit. mycol. Soc., 1949, 32: 241-4, bibl. 7, illus.

Notes on winter browning, cluster cup rust (*Puccinia*

pruni-spinosae), powdery mildew (*Oidium* sp.), downy mildew (*Plasmopara pygmaea* and *Peronospora ficariae*), and black leaf spot (*Septoria anemones* var. *coronariae*).—Rothamsted Experimental Station, Harpenden.

1839. SEGGAY, L.

Begonia culture in the Philippines.

Philipp. J. Agric., 1949, **14**: 129-53, bibl. 5, illus.

Various types of begonia, but not the tuberous type, are to be found growing wild in the Philippines, but have proved exacting when cultivated in gardens. In this article descriptions are given of varieties, climatic and soil requirements, propagation by leaf and stem cuttings, by division and by grafting and seeds, methods of potting and rearing, and diseases and pests. Varieties of the Rex or decorative type are listed according to their hardness; the climbing, creeping and tree types are all hardy. Varieties of the different types are also listed according to their flower scent. The young leaves, stems and flowers of all the varieties listed are edible. Numerous photographs, varying somewhat in clarity, accompany the text.

1840. TOMPKINS, C. M.

Botrytis stem rot of tuberous-rooted begonia.

Hilgardia, 1950, **19**: 401-5, bibl. 12, illus. (pp. 409-10).

Stem rot of *Begonia tuberhybrida* Voss, caused by *Botrytis cinerea*, is prevalent in greenhouses in parts of California, especially in cool, foggy weather and when plants are crowded and overwatered. Symptoms are described and the literature briefly reviewed. The disease may be controlled by removing all debris, excising all infected areas and painting them, as well as leaf scars, wounds and growth cracks, with Ziram paste (formerly Zerlate, zinc dimethyldithiocarbamate).

1841. ZOBRIST, —, AND MARKWALDER, —.

Fortschritte in der Bekämpfung des Begonien-Mehltaus. (Progress in begonia-mildew control.)

Gärtnerteister, 1950, **53**: 141-3, illus.

Hitherto a "Cupro"/"Deril" wash has been used to control begonia-mildew. Now a fortnightly spray with 0.1% "Forsal" + 0.4% "Deril" is suggested as an improved control measure. This wash was also successfully used on hydrangeas, calceolarias, cinerarias, azaleas and geraniums.

1842. STREETER, F.

***Cyclamen persicum*.**

J. roy. hort. Soc., 1950, **75**: 185-6, illus.

A note on the culture of this dainty, strongly scented species grown at Petworth from corms obtained from Cyprus. The corms may carry up to 200 flowers at a time and are very easy to grow. It is an ideal plant for an alpine house, and does well in a sheltered position in the garden.

1843. JOHNSON, F., AND OTHERS.

Leaf scorch of gladiolus caused by atmospheric fluorine effluents.

Phytopathology, 1950, **40**: 239-46, illus.

A leaf scorch of gladiolus was observed only in areas where the atmosphere was polluted with fluorine compounds. The symptoms were reproduced with

hydrogen fluoride in a sealed room. Some varieties are very susceptible to this type of injury, some resistant, and the remainder fall between these two extremes. In general, the resistant varieties contained more fluorine in the foliage than the susceptible ones. The fluorine content of scorched plants from polluted areas was higher than from unscorched plants grown in areas remote from such effluents.—W. Washington Exp. Stat., Puyallup, Wash.

1844. AINSWORTH, G. C.

The gladiolus smut.

Trans. Brit. mycol. Soc., 1949, **32**: 255-7, bibl. 6.

Urocystis gladiolicola n.sp. found on cultivated gladiolus in Cornwall in 1944 is described.—London School of Hygiene and Tropical Medicine.

1845. PEIRIS, J. W. L.

The Botrytis disease of gladiolus with special reference to the causal organism.

Trans. Brit. mycol. Soc., 1949, **32**: 291-304, bibl. 13.

The disease was found to be caused by *Botrytis gladiolorum* Timm. and the symptoms on flowers, leaves and corms are described. A useful measure of control is obtained by avoiding planting in heavy soil liable to waterlogging, by early lifting, by rapid drying at a high temperature, and by early cleaning.

1846. MILLER, H. N., AND MAGIE, R. O.

Control of Fusarium storage rot of gladiolus corms.

Phytopathology, 1950, **40**: 209-12.

The most effective control of Fusarium rot (*F. oxysporum* f. *gladioli*), both in storage and in the field was treatment with Spergon 2% dip or 50% dust, or a dip of Fermate $\frac{1}{2}$ % plus Dow 9B $\frac{3}{8}$ %, followed, at the time of planting, with Spergon 2% dip or New Improved Ceresan $\frac{1}{4}$ % dip.—Fla Agric. Exp. Stat., Bradenton, Fla.

1847. GOODEY, J. B.

Potato tuber eelworm and iris bulbs.

Nature, 1950, **165**: 495.

The eelworm causing disease in Dutch, English and Spanish bulbous iris varieties has been identified as *Ditylenchus destructor*.—Rothamsted Experimental Station.

1848. GREY, C. H.

Lilies in the North of England—(i), (ii).

North. Gdnr., 1949, **3**: 259-64, 291-8.

It is generally believed that with the exception of a few hardier varieties lilies will not grow well in the northern counties of England. In this article an extensive list of lilies is given, which under suitable conditions will do well there.

1849. SEELEY, J. G.

Leaf burn of lilies as affected by nutrients.

Flor. Exch., 1950, **114**: 10: 14.

Results of an experiment on Croft lilies, carried out at Cornell University, indicate that the leaf tip burn or spotting is not directly caused by nutrient deficiency. [For recommendations see *H.A.*, 10: 357.]

1850. SEELEY, J. G.

Nutrient deficiencies of Croft lilies.

Flor. Exch., 1950, **114**: 17: 16, 62, illus.

The nutrient treatments had practically no effect on the time of flowering and number of flowers except in the calcium deficient plants, where many of the flower buds "blasted", resulting in fewer flowers. The calcium and nitrogen deficient plants were shorter than the others and had light green foliage. Lilies not supplied with magnesium showed severe leaf injury. The lack of phosphorus, potassium, and boron had little effect on the growth of the Croft lilies in this experiment. The bulbs receiving no nutrients showed symptoms of nitrogen, calcium, and magnesium deficiency. [Author's summary].—Department of Floriculture, Cornell University.

1851. STEARN, W. T.

Lilium sherriffiae, a new Himalayan lily.

J. roy. hort. Soc., 1950, 75: 190-2, illus.

This species, bulbs of which were introduced from Bhutan in 1949, is described as carrying a solitary funnel-shaped flower, horizontally poised and coloured "maroon with inside of corolla chequered with gold". Descriptions of the herbarium material and the natural habitat of the plant are also given.

1352. JENKINS, J. M., Jr., AND STUART, N. W.

The effects of certain fertilizer treatments upon the growth and flower production of narcissus in North Carolina.

Proc. Amer. Soc. hort. Sci., 1949, 54: 477-81, bibl. 4, being *Pap. J. Ser. N.C. agric. Exp. Stat.* 324.

In 1947 King Alfred bulbs were planted near Wilmington, North Carolina, in a loamy fine sand, low in N and K and high in P and with a pH range 5.2 to 5.9, following a heavy ploughed-in green manure crop. Nine NPK treatments were applied and these were repeated in 1948. There were no significant differences in yield between treatments in the first year, but in the second both 1,500 lb. per acre of a 4-12-4 fertilizer and 750 lb. 4-12-4 plus a top dressing of 30 lb. N gave better yields of early flowers and of bulbs than did no fertilizer or only 250 lb. 4-12-4 fertilizer. It is noted that the bulbs used in the experiment were treated against *Fusarium* basal rot by dipping for 5 minutes in Mersolite 8 at 1 oz. per 50 gal. water.

1853. OLSON, G.

Svensk odling av tulpanlök. (The growing of tulip bulbs in Sweden.)

Årsb. svensk Jordbr. Forskn., 1950, pp. 109-15, illus.

The industry is concentrated along the coast from Blekinge to Göteborg. Experience has shown that Swedish-grown bulbs lend themselves to forcing and are in no way inferior to Dutch. Cultural methods are described.

Roses and other shrubs.

(See also 1297, 2166.)

1854. JANNE, E. E.

Ohio [Nurseryman's] Association's research program.

Amer. Nurserym., 1950, 91: 7-9, 10, 53-4, illus.

Various problems connected with the storage of nursery stock were investigated at the Ohio State

University during the 1948-49 season. Among the results obtained were the following: (1) Dormant hybrid tea roses, held in refrigerated store until 30 June, still produced excellent plants; those subjected to a gradual increase in temperature on removal from store made larger and sturdier plants than those planted outside at once. (2) Dormant rose plants, subjected to quick freeze treatment at 0° F. before being placed in permanent refrigerated storage, all died when stored at 20-25° F., whereas a 100% survival was obtained with those stored at 28-30° F. (3) Pre-storage pruning of hybrid tea roses resulted in smaller, weaker plants with fewer flowers, when pruning was severe; when it was only moderate, however, there was little difference between the performance of pruned and unpruned plants, and pruning reduced the amount of dead wood and mould infection. (4) Of 10 compounds tested for their effectiveness in preventing deterioration of burlap used on baled nursery stock, only 2, both containing copper naphthanate, proved satisfactory. (5) Fresh wood products, such as sawdust or shredded bark, are not suitable media for heeled-in nursery stock. No one medium was suitable for all types of stock.

1855. CONNORS, C. H.

Care of evergreens.

Circ. N.J. agric. Exp. Stat. 533, 1950, pp. 16, illus.

General cultural notes suitable for New Jersey conditions are given including information on control of pests and diseases and sprays necessary.

1856. MAHLSTEDE, J. P., AND O'ROURKE, F. L.

A comparison on rooting of cuttings induced by synthetic growth substances.

Proc. Amer. Soc. hort. Sci., 1949, 54: 511-12, bibl. 4, being *J. Art. Mich. agric. Exp. Stat.* 925 (n.s.).

In studies at Michigan State College, 10 growth substances, including talc, promoted rooting in softwood cuttings of 5 deciduous shrub species in varying degree. The NH₄, K and Na salts of naphthaleneacetic acid gave similar responses. Two β -naphthoxyacetates and potassium indolebutyrate gave better results and more normal root formation with species of *Ligustrum*, *Pachysandra* and *Weigela*, but were less effective than salts of naphthaleneacetic acid for two species of *Forsythia*. Two benzothiazol compounds and talc were on the whole inferior to the other substances in rooting response.

1857. SCOTT, D. B., Jr.

Effects of parathion on plants.

J. econ. Ent., 1949, 42: 782-5, bibl. 3.

Until more information is available the use of parathion on ornamentals should be limited to plants in full growth. Autumn and winter applications to dormant plants with tight terminal buds, e.g. azalea, camellia, rhododendron, syringa, forsythia, should be avoided. Apparent phytotoxicity on many species is noted.

1858. BRIERLEY, P.

Eradicant fungicides of possible value against azalea petal blight fungus, *Ovulinia azaleae*. *Phytopathology*, 1950, 40: 153-5, bibl. 5.

Treatment with cyanamide or Elgetol in advance of apothecial development will suppress apothecia of

Ovulinia azaleae for one flowering season.—Bur. Plant Ind., Beltsville, Maryland.

1859. GILL, D. L.

Effectiveness of fungicidal sprays and dusts in azalea petal blight control.

Phytopathology, 1950, 40: 333-40, bibl. 11.

For azalea petal blight (*Ovulinia azaleae*) Parzate and Dithane Z-78 dusts offer reasonably good control and are convenient for use in gardens.—U.S. Dep. Agric., Spring Hill, Alabama.

1860. MILNER, W. M.

A note on camellias.

North. Gdnr., 1949, 3: 319-21.

Camellias can be grown out of doors in the North of England in lime-free, open soil with peat or rough leaf-soil added. Varieties recommended include *C. japonica* varieties, *C. sieboldii*, Lady Claire, and *C. nagasaki*. Propagation by cuttings, layering and grafting is mentioned.

1861. MARTIN, D.

Eucalyptus in the British Isles.

J. roy. hort. Soc., 1950, 75: 186-90, illus.

From a study of some of the collections of eucalypts grown in the British Isles, the author has made a rough classification of the species according to hardiness, and at the same time gives information on the requirements, characters and value of the various species. Resistance to frost will depend very much on soil conditions, as few *Eucalyptus* will tolerate a wet soil. He concludes that there are species of high decorative value and of sufficient hardiness to be worth planting in many parts of the country. It is probable, too, that some species or hybrids could be found or produced which would find a useful place in the country's forestry.

1862. O'ROURKE, F. L.

Shredded sphagnum moss as a growing medium for newly-propagated American holly.

Proc. Amer. Soc. hort. Sci., 1949, 54: 505-7, bibl. 4.

Two consecutive years, on 17 February, cuttings of two varieties of *Ilex opaca*, Howard and Tabor No. 3, growing in Washington, D.C., were potted in a soil mixture and in sphagnum moss prepared by passing dry moss through a hammer mill with a 1-inch screen. In both years sphagnum proved superior as a growing medium, especially in the second year when a more highly concentrated nutrient solution was used and applied more frequently. A small trial with *I. cornuta* and *I. glabra* showed similar growth differences in favour of shredded sphagnum moss.

1863. GARTNER, J. B., O'ROURKE, F. L., AND HAMNER, C. L.

The influence of a plastic resin in increasing survival with summer-transplanted evergreens under severe conditions.

Proc. Amer. Soc. hort. Sci., 1949, 54: 508-10, bibl. 2, being *Pap. J. Ser. Mich. agric. Exp. Stat.* 1083.

In preliminary small-scale trials at Michigan State College, spraying *Picea alba* and other evergreens and 2-year-old apple trees with vinyl resin latex in a 10% suspension with a wetter before transplanting in June gave promising results.

1864. ENFIADŽJAN, A.

Double-flowered forms of the dwarf pomegranate. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 74-5.

Three double-flowered varieties of the dwarf pomegranate (*Punica granatum* var. *nana*) are mentioned—variegated, red, and bright yellow. These are recommended as ornamental trees in parks, squares, and private gardens.

1865. ANON.

Bud blast on rhododendrons and azaleas.

J. roy. hort. Soc., 1950, 75: 230-2, illus.

During the last few years bud blast of rhododendrons has become serious, especially in south-east England. Little work has been done on the disease in this country, but the control measures practised in America for the same or a similar disease, known as bud and stem blight of azaleas and caused by *Sporocybe azaleae*, are summarized in this note from the R.H.S. Garden, Wisley. These measures include pruning and destruction of diseased twigs and buds, dusting with copperlime dust and spraying with bordeaux mixture. In America they have only been applied to deciduous azaleas, so their use on evergreen rhododendrons would be experimental.

1866. FUNCK, E., AND V. RATHLEF, H.

Die Farben der Rosenblüten und ihre objektive Erfassung und Darstellung. (The objective determination and description of the colour of rose flowers.)

Gartenbauwiss., 1940, 15: 140-6 [received Nov. 1949].

An extract of rose petals is measured photometrically and the wavelengths obtained with different filters are recorded graphically. The method offers the dual advantage of making an exact colour description possible without reference to a colour chart and of telling the breeder whether a certain colour is composite or pure.

1867. DUPERREX, A.

Le système racinaire des rosiers porte-greffes. (The root system of rose root-stocks.)

Rev. hort. suisse, 1950, 23: 193-5.

Five species of *Rosa*, which are used as rootstocks for garden and greenhouse roses, were grown in the following three different media in order to study their effect on root development: (1) a rich loam soil; (2) 15 cm. of soil in a tank overlying a gravel bed which was continuously irrigated; and (3) in gravel irrigated 3-4 times daily with a nutrient solution. A photograph illustrates the striking differences in root development for *Rosa manetti*, but the picture is typical of all the 5 species. In the case of treatment (1) there were a few strong roots penetrating deep into the soil. Treatment (2) caused the roots to grow horizontally, strong roots being intermingled with fibrous roots, while treatment (3) produced a tuft of fibrous roots without any tap roots. Further trials showed that the vigour of the rootstock, which is a specific character, was not affected by the development of the root system.—Laboratory of agricultural chemistry, Châtelaine-Geneva.

1868. SHANKS, J. B., AND LAURIE, A.
Rose root studies: some effects of soil moisture content.
Proc. Amer. Soc. hort. Sci., 1949, 54: 473-6, bibl. 3, illus.

Further results of experiments made at Columbus, Ohio, and noted in *H.A.*, 20: 368 are summarized by the authors as follows: A study of the roots of Better Times roses which had grown in several different moisture conditions indicated that the following were influenced directly or indirectly by the relative amounts of moisture present in the surrounding root medium: Length and diameter of roots, branching or formation of lateral roots, number and persistence of root hairs, differentiation of vascular tissues, differentiation of the endodermis, deposition of suberin and tannins, and the presence of passage cells in the endodermis, formation and duration of activity of phellogens, presence of lacunae in the cortex, and extent and ultimate form of periderm.

1869. SHANKS, J. B., AND LAURIE, A.
Rose root studies: some effects of root aeration.
Proc. Amer. Soc. hort. Sci., 1949, 54: 485-90, bibl. 5, illus.

No significant differences were found in concentrations of sugars, starch, nitrogen compounds or potassium in the tops or roots of Better Times roses with carbon dioxide concentrations as high as 20% or oxygen concentrations ranging from 1% to 29% of the air surrounding their roots. The treatments did, however, have various effects on the diameter of young roots, formation of lacunae in the cortex, the formation of a spongy periderm, accumulation of tannins in the endodermis and periderm, the degree of suberization of the outer layers of the periderm, the number of root hairs, the number of heavily lignified phloem fibres and the rate of cell division in the phellogen. Structural differences found in roots which had grown under conditions of high moisture were similar to the collective effects of high CO₂ and low O₂ concentrations [see also abstract above and *H.A.*, 20: 368].

1870. KOHL, H. C., FOSLER, G. M., AND WEINARD, F. F.
The effect of several temperatures on flower production in roses.
Proc. Amer. Soc. hort. Sci., 1949, 54: 491-4, bibl. 9.

Three varieties of roses growing in a greenhouse at Urbana, Ill., were subjected in 1946-47 to soil temperatures of 80° F. and 70° F. compared with unheated controls averaging 60° to 65° F. In 1947-48 the variety Better Times was subjected to soil temperatures of 85° F. and 75° F. Number of flowers per plant was adversely affected by heating, with the largest reduction at the highest soil temperature used each season.

1871. SHANKS, J. B., AND LAURIE, A.
Rose root studies: some effects of soil temperature.
Proc. Amer. Soc. hort. Sci., 1949, 54: 495-9, bibl. 11, illus.

Rooted cuttings of Better Times rose growing in pots in a greenhouse were subjected from November to March to soil temperatures of 56, 60, 64, 68 and 72° F.

Air temperatures were 60° F. by night and 65 to 70° F. by day. 64° F. root temperature gave best growth of tops. Production of roots declined progressively as the temperature increased from 56 to 72° F. Soil temperatures influenced the diameter of young roots, number of primary xylem points, accumulation of tannins in the endodermis, number of phloem fibres and number of root hairs. The effect on carbohydrate fractions was slight, but roots growing at lower temperatures contained greater concentrations of the different nitrogen fractions.

1872. HATHAWAY, W. B.
Preliminary research on K6451.
Bull. N.Y. St. Flower Gr., 1949, No. 50, p. 3.

Preliminary tests have been made at Cornell University against two-spotted mite, or "red spider" [*Tetranychus bimaculatus*] on roses, with a number of materials. K6451, made by the Dow Chemical Company, shows outstanding promise, and has several properties that supplement parathion. Used in aerosol form at the rate of 0.5 g. parathion plus 1 g. K6451 per 1,000 cubic feet it gave excellent results. Applications on carnations and chrysanthemums have also been made.

1873. BLAUVELT, W. E., AND HATHAWAY, W. B.
K-6451 aerosol for greenhouse mite control.
Down to Earth, 1950, 5: 4: 2-4, illus.

In trials on greenhouse flower crops, particularly roses, K-6451 (p-chlorophenyl p-chlorobenzene sulphinate) at 1 g. per 1,000 cu. ft. has shown high mite egg kill, long residual effectiveness, good plant tolerance, and low animal toxicity. It was fairly effective against strains of mite adults resistant to parathion and TEPP, but not against the cyclamen mite, *Tarsonemus pallidus*, nor against other types of greenhouse pests, except the soft brown scale, *Coccus hesperidum*.—Cornell Univ. agric. Exp. Stat., Ithaca, N.Y.

1874. WILLIAMSON, C. E.
A recently observed effect of diseases on plants.
Bull. N.Y. St. Flower Gr., 1949, No. 49, pp. 3-4.

Tests with black spot [*Diplocarpon rosae*] diseased rose leaves, at the Cornell University, suggest that the ethylene produced by the diseased tissues is the cause of yellow coloration and abscission of leaves. Results of further tests with other flower diseases indicate that the quantity of ethylene produced is dependent upon the fungus involved and is not characteristic of the rose plant. The mechanism by which ethylene production is stimulated is as yet unknown. The utmost care in packing, glasshouse hygiene, and disease control are suggested as preventive measures.

1875. SNYDER, W. E.
Response of cuttings of *Taxus cuspidata* to treatments containing powdered growth regulator and Fermate.
Proc. Amer. Soc. hort. Sci., 1949, 54: 500-4, bibl. 6.

Cuttings of *T. cuspidata* received 18 treatments involving two commercial powdered growth regulators, Hormodin 2 and Formula 66 each mixed with Fermate

(ferric dimethyldithiocarbamate) in 9 proportions ranging from 0 to 100%. Callus formation was inhibited by the treatments, the effect being most pronounced with mixtures containing large amounts of Fermate or with Fermate used alone. This inhibiting effect had disappeared 120 days after treatment. Treatments containing 90% or more growth regulator significantly increased rooting after 90 days, but after 120 days only 90% growth regulator—10% Fermate showed a significant increase in rooting. Fermate alone markedly inhibited rooting at 120 days, but this effect had disappeared after 200 days. It is suggested that Fermate may act as an anti-auxinic material.—Cornell University.

1876. CHANDLER, W. H.

Pruning trials on wisteria vines.

Proc. Amer. Soc. hort. Sci., 1949, 54: 482-4.

Small scale trials in Los Angeles, California, on *Wisteria floribunda* variety Royal Purple, *W. sinensis*, *W. sinensis alba*, *W. venusta alba* and *W. venusta violaceae* indicated that cutting back of unwanted shoots to stubs with 4-5 buds in the summer immediately after flowering, followed, if necessary, by further shortening in winter will encourage a higher percentage of the remaining buds to produce flower clusters, and flower clusters to be longer and contain more flowers. More drastic summer pruning may tend to prevent flowering in most varieties of *W. floribunda*, and may reduce resistance to winter injury.

Lawns.

(See also 2133.)

1877. ANON.

Eine neue Rasenart für heisse und trockene Lagen. (A new grass variety for hot and dry positions.)

Gärtnermeister, 1949, 52: 402.

The firm Longhi of Monza in Italy have introduced a new variety of lawn grass. It was found on the sandy banks of the Po and is tentatively named *Agrostis canina*. This fine grass is not sold as seed but by the square and may be used for exhibition purposes.

1878. ANON.

Centipede grass made to seed by science.

Seed World, 1950, 66: 9: 43.

Centipede grass, considered to be one of the best lawn grasses available for the southern United States, normally produced practically no seed and had to be propagated vegetatively. By determining the right fertilizer and clipping treatments [details not given here] the U.S. Department of Agriculture and the Georgia Agricultural Experiment Station have made it possible

to produce seed at the rate of 150 lb. or more to the acre.

Noted.

1879.

a BOURSNELL, J. G.

The symbiotic seed-borne fungus in the *Cistaceae*. I. Distribution and function of the fungus in the seedling and in the tissues of the mature plant.

Ann. Bot. Lond., 1950, 14: 217-45, bibl. 34, illus.

b CANRIGHT, J. E.

Pollen morphology of the *Magnoliaceae*.

Abstr. in *Amer. J. Bot.*, 1949, 36: 795.

c ERNST, A.

Addenda, Corrigenda und Desiderata zur Genetik des amphidiploiden Artbastards *Primula kewensis*. (The genetics of the amphidiploid species hybrid *P. kewensis*.) [English summary $\frac{3}{4}$ p.]

Arch. Julius Klaus-Stift., 1949, 24: 17-104, bibl. 60, illus.

d GIANFAGNA, A.

Bulb, potted plant and cut flower production research on Long Island.

Bull. N.Y. St. Flower Gr., 1949, No. 49, pp. 10-11.

Includes gladiolus weeding and carnation nutrition.

e HEYER, F.

Ueber Bäume an Asphaltstrassen. (Road-side trees.)

Dtsch. Baumsch., 1949, 1: 259-60.

Ornamentals at Frankfurt/M.

f HOLTUM, R. E.

Gregarious flowering of the terrestrial orchid *Bromheadia finlaysonianae*.

Gdns Bull. Singapore, 1949, 12: 295-302, bibl. 2.

g HOLTUM, R. E.

The selection of type-species of some old genera of ferns [*Pteropsis*, *Trichomanes*, *Belvisia*, *Thelypteris* and *Ctenopteris*.]

Gdns Bull. Singapore, 1949, 12: 303-6.

h MILLINGTON, W. F., AND GUNCKEL, J. E.

Structure and development of the vegetative shoot tip of *Liriodendron tulipifera* L.

Abstr. in *Amer. J. Bot.*, 1949, 36: 800.

i WETMORE, R. H., AND PRATT, C.

The growth and auxin relations of leaves of the maidenhair fern, *Adiantum pedatum* L.

Abstr. in *Amer. J. Bot.*, 1949, 36: 806.

SUB-TROPICAL CROPS.

General.

1880. KHAN, A. A.

Fruit-growing industry in Pakistan.*Agric. Pakistan*, 1949, 1: 36-8.

A short general account of the industry, which embraces tropical, sub-tropical and temperate fruits, with suggestions for its improvement.

1881. HARTLEY, W.

Plant collecting expedition to sub-tropical South America 1947-48. A report, with notes on the climate, vegetation and principal economic plants, with an inventory of the collections.

Div. Rep., Div. Pl. Ind. C.S.I.R.O. Aust. 7, 1949, pp. 96, bibl. 24.

Although the primary object of this expedition, a joint project of the Division of Plant Industry, C.S.I.R.O., Australia, and the Division of Plant Exploration and Introduction, U.S.D.A., was to make a collection of wild and cultivated peanuts, promising material of pasture, forage, crop and ornamental plants of particular interest was also collected. A full annotated list of the material collected is given in an appendix. Species of horticultural interest include apiseed, black pepper, broad bean, French bean, chicory, melon, pea, quinine, squash, sweet corn, tobacco, tomato and "Yerba Mate".

1882. NEWMAN, J. V., AND ARMITAGE, H. M.

The oriental fruit fly [*Dacus dorsalis*].

Yearb. Calif. Avocado Soc. for 1949, pp. 47-54.

A general account is given of the oriental fruit fly and its host plants in Hawaii with suggestions on measures to prevent its spread to the mainland. A very well produced coloured picture of the fly is included.

Avocado.

1883. GUYOT, H.

Notes sur l'avocatier. Botanique, climat, exigences agrologiques. (Notes on the avocado. Its morphology and soil and climatic requirements.)

Fruits d'outre mer, 1949, 4: 419-25, bibl. in text, illus.

A general account, illustrated with diagrams and photographs, is given of avocado flowers and of flowering behaviour and cross-pollination of the A and B groups. There is a note on the fruit with a diagram showing the proportions of flesh, skin and seed in 12 well-known varieties. Under climate, varieties are grouped according to their resistance to low temperature; areas suitable for avocados in tropical French Africa are mentioned briefly, and there are notes on windbreaks. Soils are discussed with special reference to texture and pH, and experience in California is cited.

1884. POPENOE, W.

Races and racial origins [of avocados].

Yearb. Calif. Avocado Soc. for 1949, pp. 58-9.

The writer accepts the view that the Mexican varieties

of avocados form a distinct race, but considers that the so-called West Indian and Guatemalan races are probably of common origin.

1885. HALMA, F. F., AND FROLICH, E.

Storing avocado seeds and hastening germination.

Yearb. Calif. Avocado Soc. for 1949, pp. 136-8, illus.

Avocado seeds of 20 varieties, packed in dry peat moss and stored at 42° F., kept well for at least 8 months. Cutting off a small portion of both ends of the seeds promoted quicker and more even germination. [Authors' summary.]

1886. POPENOE, W.

An experiment with vinyl film for the preservation of avocado budwood.

Yearb. Calif. Avocado Soc. for 1949, pp. 172-3.

During a test made at the Escuela Agrícola Panamericana Tegucigalpa, Honduras, 0.004 gauge Good-year Vinyl film was found to be a satisfactory lightweight wrapper for avocado budwood to be shipped abroad. The inclusion of sphagnum moss appears to be undesirable.

1887. FIESTER, D.

The coyo: a root stock for the avocado?

Yearb. Calif. Avocado Soc. for 1949, pp. 27-31, illus.

To make it possible to grow avocados in regions where climatic conditions are favourable but "root rot" is caused by deficient drainage and/or the fungus *Phytophthora cinnamomi*, wild species of *Persea* are being collected at the Escuela Agrícola Panamericana Tegucigalpa, Honduras, as a source of possible new rootstocks. Among these, *P. schiedeana*, the coyo, which makes strong growth and has a shallow root system is described. Successful budding trials with commercial varieties (Guatemalan × Mexican hybrids) are mentioned.

1888. HALMA, F. F., WHITE, F. A., AND HARTMAN, H.

Grafting cold-injured avocados.

Yearb. Calif. Avocado Soc. for 1949, pp. 83-6, illus.

An experiment is described in which a high proportion of frost damaged trees were restored by wedge grafting below soil level. Clear diagrams of the procedure are given.

1889. WHITE, F. A.

The care and protection of young avocado trees.

Yearb. Calif. Avocado Soc. for 1949, pp. 77-81, illus.

Practical methods are outlined for budwood selection, irrigation, pest control and wind, sun and frost protection. Four methods of protecting young trees from frost are illustrated.

1890. HAAS, A. R. C.

Growth of avocado seedlings as affected by the rate of soil drainage.

Yearb. Calif. Avocado Soc. for 1949, pp. 139-43.

With a soil that drained without much difficulty, a study was made of the effect of reducing the rate of drainage of excess soil moisture upon the growth of avocado seedlings. The total fresh weights (leaves, trunk, and root) of avocado seedlings and the heights and fresh weights of the trunk were greatest when the rate of drainage was neither too slow nor too rapid. The fresh weights of the roots increased as the rate of drainage decreased except that where no drainage occurred the fresh weight of the roots was the lowest. [Author's summary.]

1891. ROUNDS, M. B.

Non-tillage of avocado orchards.

Yearb. Calif. Avocado Soc. for 1949, pp. 101-3, illus.

Methods of soil management without tillage, involving cover cropping and the use of sprays against weeds, are examined.

1892. COONY, J. J.

Irrigating avocados.

Yearb. Calif. Avocado Soc. for 1949, pp. 87-95.

Factors affecting the efficient use of irrigation water are considered with reference to the relationships between available water and field capacity of different soil types. The effects of mulching and weeding are discussed. Water losses and frequency of application are considered and formulae are included for calculating water usage by sprinkler and furrow irrigation.

1893. AVERETT, W. E.

Tree thinning the avocado grove by the block system.

Yearb. Calif. Avocado Soc. for 1949, pp. 110-17, illus.

A system of thinning is described with the aid of diagrams which leaves regular spacing while retaining the most desirable trees.

1894. HAAS, A. R. C.

Effect of the application of complete fertilizers on the composition of Fuerte avocado fruit.

Yearb. Calif. Avocado Soc. for 1949, pp. 166-71, bibl. 4.

The use of P and K in addition to N in the fertilizer programme resulted in greater absorption of these elements than when N fertilizers were used alone. The increase occurred not only in the leaves but also in the skin, pulp and seed. Whether these additional elements will be effective in improving the keeping and eating qualities of the fruit remains to be determined. Tables are presented showing contents of P and K in various portions of the fruits and of Ca and Mg in avocado seeds.

1895. HAAS, A. R. C.

Growth and composition of avocado seedlings in soil cultures as affected by the relation of calcium to magnesium in the applied solution.

Yearb. Calif. Avocado Soc. for 1949, pp. 144-54.

The mineral content of avocado and citrus leaves is

compared. A higher content of Mg and lower of Ca is to be found in the former. Avocado seedlings were grown in soil culture, each culture receiving the same amount of N, P and K, but various concentrations of Ca and Mg. As the Mg concentration was increased and that of Ca decreased the fresh weight and size of the leaves and trunk length increased, but growth was retarded when Ca became too low relative to Mg. When the Ca concentration was increased and that of Mg decreased the mature upper leaves of Fuerte avocado seedlings showed a higher Ca content and the lower leaves a lower Mg content. Greater K and Na absorption occurred in the mature leaves as the Mg concentration in the culture solution increased and that of Ca decreased. In the rootlets the lowest K content was found where the culture received the highest Ca concentration and no Mg.

1896. CURTIS, D. S., AND ZENTMYER, G. A.

Effect of oxygen supply on phytophthora root rot of avocado in nutrient solution.

Amer. J. Bot., 1949, 36: 471-4, bibl. 13, illus.

It has been considered that *Phytophthora cinnamomi* affects avocado most severely in wet, poorly drained soils. In order to study the effect of oxygen supply on the development of the root rot, avocado seedlings were grown in nutrient solutions at various oxygen levels ranging from 7.2 to 0.05 p.p.m. Half of the seedlings at each level were inoculated with *P. cinnamomi*. All inoculated seedlings finally died, but, contrary to expectations, root attack by the fungus was most rapid and severe at the highest oxygen level (7.2 - 6.8 p.p.m.), where nearly all the roots became discoloured within 2 days. Effects of oxygen deficiency were observed in all seedlings supplied with less than 0.5 p.p.m. oxygen, and seedlings grown at this low level for 4 days or more did not recover when returned to full aeration. Thus, in the field, avocado trees may suffer from injury by *P. cinnamomi* under conditions of ample moisture at any level of oxygen, and from injury due to oxygen deficiency under severely water-logged conditions.—Citrus Exp. Stat., Riverside, Calif.

1897. MALAN, E. F.

The die-back of avocado trees.

Fmg S. Afr., 1950, 25: 31-2, illus.

Decline and die-back of many avocado trees in the Transvaal is attributed mainly to unfavourable soil conditions, notably to a clayey or otherwise impermeable sub-soil. Among suggested control measures are mulching and as shallow cultivation as possible, regular and adequate manuring and avoiding too frequent irrigation. *Phytophthora cinnamomi* is a contributory cause of the trouble, vegetatively propagated trees being apparently more susceptible than seedlings.—Subtropical Hort. Res. Stat., Nelspruit.

1898. COIT, J. E.

Is the Taft variety a hidden carrier of sun-blotch?

Yearb. Calif. Avocado Soc. for 1949, pp. 55-6.

Cases are described in which several avocado varieties top-worked on to Taft trees developed sunblotch, in circumstances that suggest that Taft may be a symptomless carrier of the virus.

Citrus.

1899. HARDY, E.

Prospects of the Israeli citrus industry.*Food Manuf.*, 1949, 24: 547-8, illus.

With the loss of many Arab growers resulting from the civil war and the substitution of unskilled Jewish immigrants, the citrus industry of Israel suffered heavy setbacks. Competition on the European markets is great and it will take some time before technical improvements can be introduced and Jaffa oranges marketed in increased numbers and at lower prices. The Israeli Government is setting up a new single Citrus Board with wide authority. At the Weizmann Institute at Rehovot work is being carried out on processing citrus by-products.

1900. MATHON, C.-C.

Nouveaux progrès de la culture des agrumes en Union soviétique. (Progress in citrus culture in the Soviet Union.)*Fruits d'outre mer*, 1949, 4: 380, bibl. 3 in text.

A note on recent Russian work on the extension of lemon cultivation by the use of prostrate trees, based on experience with figs, and the use of the cold-resistant Pavlovo variety. Hybridization is also being carried out between the frost resistant Japanese mandarin Unshiu, which is a bud mutation, and other citrus species.

1901. VENNING, F. D.

Cortical tracheids in the African cherry oranges (*Citropsis* species, *Rutaceae*: *Aurantioideae*).*J. Wash. Acad. Sci.*, 1949, 39: 383-9, bibl. 13, illus.

Cortical tracheids, which develop from vacuolate cortical parenchyma, or "ground parenchyma" of floral organs and which have a different ontogeny from the true xylem elements, are described from the flowers of 10 of the 11 known species of *Citropsis*. In this genus cortical tracheids were found adjoining the true xylem of the vascular bundles, or as extensions of the vascular supply, or as strands of xylem independent of the main vascular system. They occurred in different circumstances and in different floral organs in each of the species, which makes them useful as an additional taxonomic character to help distinguish between the species. It is suggested that because of the limited number of xylem elements differentiated in the true vascular bundles, and the limited length of many of the vascular bundles, the cortical tracheids, when associated with the regular vascular supply, function in a water-conducting capacity. [Author's summary.]

1902. SIMONNEAU, P., AND AUGUSTE, A.

La clémentine "Montréal". (The clementine orange variety Montréal.)*Ann. Inst. agric. Algér.*, 1949, 4: 8: 1-28, illus.

A large number of trees of the clementine variety Montréal have been planted in the neighbourhood of Habra, Algeria, since 1940. Comparative studies with the ordinary clementine orange which are reported here show that the new variety possesses the following advantages: (1) The fruit matures at least 15 days

earlier. (2) It crops much more heavily and more regularly. (3) The fruit is slightly larger and more uniform in size. It has a larger number of seeds, the average being 18, but a seedless mutation has been discovered and is being studied.

1903. AUGUSTE, A., AND SIMONNEAU, P.

La clémentine "Montréal": Perrégaux

1949. (Trials with the clementine orange

Montréal at Perrégaux, 1949.)*Fruits et Prim.*, 1950, 20: 4-6, bibl. 3, illus.

The early maturity of the fruit and high yields noted earlier [see abstract 1902 above] have been confirmed in 1948 and 1949. Observations on the behaviour of trees on 4 rootstocks are given, but further studies of rootstocks as well as of soils and manuring will be needed before definite recommendations can be made. There appear also to be different forms of Montréal, two of which are described here, one with oblate and the other with pyriform fruits.

1904. SIMONNEAU, P.

La clémentine "Montréal": observations

sur les différents types: Perrégaux 1949.

(Observations on different types of Montréal clementine at Perrégaux in 1949.)*Fruits et Prim.*, 1950, 20: 79-82, bibl. 2, illus.

Two types of Montréal clementine [see 1903, above] are compared in some detail. While both are superior to the ordinary clementine the oblate type is better than the pyriform, having more juice, fewer seeds, and fewer and more uniform segments. Two other completely seedless types have proved disappointing, one because of low yields, the other because the fruit matures later than that of Montréal.

1905. GORDON, K. A.

A method of grafting citrus on branches. [Russian.]*Sad i Ogorod* (Orchard and garden), 1950, No. 2, p. 77, illus.

The method consists in inserting a cutting by a tongue graft on to a branch, the lower end of the scion being in a vessel of water, and the upper part hermetically sealed, with waxed paper, in a test tube. It is recommended for experimental tests only.

1906. LARUE, R. G.

Stump grafting of citrus.*Calif. Citrogr.*, 1950, 35: 182-3, 202, illus.

A summary is given of the first year's experience in top-working a seedling orange grove thought to be about 80 years old. Bark grafting on to shaded stumps, 12 to 22 inches in diameter, was the method used and results to date suggest it will be successful.

1907. MUZIK, T. J.

Some experimental studies on citrus in Liberia, West Africa.*Lloydia*, 1949, 12: 233-8, bibl. 6.

Several propagation experiments are described briefly. 1. *Cuttings*: Rooting of cuttings in sand in the open but under shade, with or without hormone treatments, proved unsatisfactory. 2. *Seed germination*: Rough lemon gave the most rapid and complete germination followed in order by sour orange, common lime, grapefruit and tangerine. 3. *Buddable stock*: At 12 months the percentage of seedlings that had reached

buddable size ranged from 75% for rough lemon to 40% for grapefruit and tangerine. Limes showed excessive growth of adventitious buds. 4. *Budding*: Patch budding gave 90-95% take in all cases, using local grapefruit and tangerines and several imported varieties as scions. 5. *Transplanting*: With several varieties on rough lemon stock, cutting back in the nursery one month after budding and transplanting to permanent positions seven days later when the buds had begun to swell gave better results than did cutting back and transplanting on the same day. 6. *Rejuvenation of dried budwood*: Budwood that had become too dry for the bark to "peel" was planted like cuttings in moist sand under light shade and after about two weeks the bark lifted readily.

1908. RICHARDS, A. V.

The influence of rootstock on growth of budgrafted citrus.

Trop. Agriculturist, 1948, **104**: 182-9, bibl. 15, illus. [received Dec. 1949].

In nursery beds at 3,500 ft. at Malpocha, bud-grafts of Washington Navel orange, Nagpur Santra mandarin and seedless Tahiti lime grew well on rough lemon stock, but turned chlorotic and showed die-back on European lemon seedlings. Unbudded lemon seedlings and Eureka lemon on lemon stock made healthy growth. The presence of starch in pith and phloem tissues both above and below the unions of unhealthy plants suggest that the condition was not due to a virus. Chlorosis also appeared in sweet oranges and grapefruit budded on sour orange at Peradeniya, and some grapefruit plants were found to be devoid of starch below the bud union. Similar combinations in other nurseries made healthy growth. Rootstock field trials were started at Peradeniya and Moneragala in 1945 using the local sweet oranges, Bibile and Vavuniya, as scions, and also grown as nucellar seedlings. At three years trees on rough lemon had made the most growth, trees on sweet orange and seedling trees were intermediate, while those on sour orange were weakest, but only those at Peradeniya were chlorotic and unhealthy. Trees have also been raised on the Patharan, *C. megaloxycarpa* var. *penivesiculata*, for future trial; unirrigated 10-year-old grapefruit trees have done well on this stock on rocky land in a semi-dry zone at Nalanda.

1909. MCALPIN, D. M.

Rootstock trials: Superiority of sweet-orange stock for navels and Valencias on different soils at Irymple.

Citrus News, 1949, **25**: 163.

Results to date of trials on three soil types at Irymple, Victoria, are summarized for both Washington Navel and Valencia Late scions. Trees on sweet orange stocks have shown marked superiority over trees on sour orange or rough lemon as regards tree size, health, yield of fruit and quality. "Bud-union decline" has been in evidence in trees on sour orange (the virus, which is aphid-transmitted, has also attacked grapefruit and mandarins on sour orange), and boron poisoning has been most in evidence in trees on rough lemon. A super-imposed NPK fertilizer experiment started in 1940 has so far yielded no results. A new rootstock trial involving 8 strains of sweet orange stocks with 4 orange scion varieties has been started [see also *H.A.*, 18: 597, 1342, 2896].

1910. BENTON, R. J., AND OTHERS.

Stunting and scaly butt of citrus associated with *Poncirus trifoliata* rootstock.

Agric. Gaz. N.S.W., 1949, **60**: 521-6, 577-82, 641-5, 654; 1950, **61**: 20-2, 40, bibl. 18, illus.

Poncirus trifoliata has features which recommend it as a citrus rootstock. Its principal defect is that it stunts certain scions, the stunting commonly being associated with the development of scaly butt. This effect has been considered negligible with the late Valencia orange and the main varieties of mandarin; the effect varies in its incidence with the Washington Navel orange and varieties of grapefruit, and is universal when lemon is used as the scion. It has therefore been recommended for Valencia orange, mandarin and grapefruit, but not for other types of citrus. Morphological variation has been found in trifoliata and selections have been used for stock trials. Evidence is presented that scaly butt is due to virus infection. The use of buds from unaffected trees on trifoliata stock is recommended for avoiding scaly butt in oranges, grapefruit and mandarins.

1911. ANON.

Citrus and passion fruit.

Fruit World, Melbourne, 1949, **50**: 9: 15, 17.

Passion fruit can be grown successfully as a catch crop in newly established citrus orchards in New South Wales, provided soil fertility is maintained by a balanced manurial programme and control of soil erosion is assured.

1912. SOLODOVNIKOV, V. JA.

Irrigating citrus trees grown in trenches. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 2, pp. 41-2, illus.

A method of growing citrus trees in trenches and irrigating them by overhead sprinkling is described. The trenches are about 2 m. deep, and are designed to protect the trees from excessive cold in winter.

1913. BLINOV, L. F.

Some questions relating to the construction of trenches and ground sheds for citrus growing. [Russian.]

Sad i Ogorod (Orchard and garden), 1950, No. 3, pp. 35-8, illus.

The construction and maintenance of deep trenches for citrus growing [see above, No. 1912] in Moldavia, Ukraine, and southern Crimea, are described.

1914. GALTIER, —, AND OTHERS.

Compte-rendu des résultats d'un essai de mise à fruits de clémentinier par taille et incisions (1ère année) Domaine de Beni Amar 1948. (First year's progress report on a pruning and ringing trial to induce fruiting in clementine oranges.)

Reprint from *Terre marocaine*, July 1949, No. 236, pp. 7.

The material used consisted of clementine oranges grafted on sour orange planted in 1930. Mean yields per tree had been recorded for the 12 years of bearing, and showed marked decline in the last two seasons, the crop for 1947 being negligible. In 1948 5 treatments were applied: Fairly hard pruning, removing

about one-third of the foliage, combined with one, two or three ringings of the main branches, two ringings without pruning, and no ringing or pruning. Ringing consisted of a single circular cut down to the cambium. The first ringing was done on 28 February at the outset of blossoming, the second 5 cm. below the first on 23-26 March before blossoming was completed, and the third on 9 June. Treatments were repeated in two parts of the grove on 5 trees in each case. Yields were generally above those of the two preceding years, but the two and three ringings increased yields three- and four-fold in the two parts of the orchard irrespective of whether the trees had been pruned or not. The influence of pruning has not so far been marked. Experiments are to continue.

1915. CAMERON, A. E.

Alternate cropping: thinning and pruning trees in on-year to avoid wide yield fluctuations.

Citrus News, 1950, 26: 19.

Trials at the Griffith Research Station showed that thinning up to one-third of the Valencia Late orange crop early in the on-year slightly increased fruit size in the same year and considerably increased numbers of blossoms and fruit set in the succeeding off-year. It is suggested that thinning might be most easily achieved by general pruning.

1916. STEWART, W. S., AND HIELD, H. Z.

Effects of water sprays of 2,4-D and 2,4,5-T on fruit drop and production of lemon trees.

Calif. Citrogr., 1950, 35: 93, 112, bibl. 6.

Trials made between 1946 and 1949 in 8 field plots in California are described. Sprays containing 5 p.p.m. 2,4-D or 2,4,5-T significantly reduced mature fruit drop and the drop of mature leaves, 2,4,5-T being the more effective. Both sprays induced distortion in young leaves but did not reduce fruit yield or quality; neither reduced the drop of immature fruit. In one plot 8 p.p.m. 2,4,5-T as the butyl ester and 2,4-D as the triethanolamine salt produced significant yield increases of 31.9% and 24.4% due to greater fruit size in the 12 months following spraying. The isopropyl ester of 2,4-D at 8 p.p.m. failed to increase yield significantly.

1917. HAAS, A. R. C.

Fertilizer distribution and citrus tree growth.

Calif. Citrogr., 1950, 35: 136-7, 166-7, bibl. 3, illus.

Rooted Valencia orange cuttings with 2 main roots and pruned to 2 main branches were used in experiments to determine cross-transfer of nutrients. Earlier work had shown that, when one part of the root system was kept short of water, cross-transfer of water occurred in the trunk, so that no part of the top showed evidence of water deficit. In the nutrient trials the two halves of the root system received the same culture solution except that one contained high calcium nitrate and the other low. Where the two roots and branches were in the same plane, no appreciable cross-transfer of nutrients occurred as evidenced by much better root and shoot growth of the high N half of the tree. Where the plane of the branches was at right angles to that of the roots, both roots contributed equally to the growth of the two branches.

1918. REBOUR, H.

Essais de fumure au gaz ammoniac à la Station expérimental d'Agrumiculture de Boufarik. (Manurial trials with ammonia gas at the citrus experimental station at Boufarik.)

Fruits et Prim., 1949, 19: 348, illus.

Experiments [not described here] are in progress in Algeria on the use of ammonia dissolved in irrigation water as a fertilizer for citrus, with special reference to possible adverse effects on soil structure and humus content.

1919. HAAS, A. R. C.

Mineral-element deficiency or excess and tipburn in citrus leaves.

Calif. Citrogr., 1950, 35: 184-5, 198-9, illus.

Observations on trees grown in sand cultures suggest that the direction of the base line of leaf tip-burn is generally at right angles to the midrib or proceeds faster at the leaf margins in the case of a mineral-element excess, whereas with a deficiency the base line of the tip-burn is often V-shaped, making its greatest advance along the midrib. Examples illustrated photographically are tip-burns due to excessive calcium and sodium chlorides and boron and to deficiencies of potassium and phosphates.

1920. GUEST, P. L., AND CHAPMAN, H. D.

Investigations on the use of iron sprays, dusts, and soil applications to control iron chlorosis of citrus.

Proc. Amer. Soc. hort. Sci., 1949, 54: 11-21, bibl. 3, illus.

Thirty-eight different iron salts were applied as a spray by workers of the Riverside Citrus Experiment Station, California, to iron chlorotic orange leaves and 33 to iron chlorotic lemon leaves. Ferrous sulphate with a good wetting agent such as Vatsol proved cheaper than and nearly as good as any compound used and the holding of further field trials is recommended at the rate of 2 lb. per 100 gal. with Vatsol included at 1 lb. per 100 gal. The authors emphasize the fact, however, that the problem remains unsolved and they note the following factors other than free lime which may produce or influence iron chlorosis: excessive soil moisture, cold soil temperatures, excessive phosphate, potash deficiency, magnesium deficiency, excessive zinc, excessive soluble salts and possibly soil organisms.

1921. WYSS-DUNANT, E.

Considérations sur le gaufrage des oranges.

(The "creasing" disorder of oranges.)

Fruits et Prim., 1950, 20: 47-50, illus.

Observations suggest that creasing or puffing of the skins of oranges associated with cracking of the albedo is commonest amongst adult trees of early maturing varieties such as Washington Navel. The immediate cause of this physiological disorder seems to be excessive heat in the middle and end of summer. It appears to be associated with a general impoverishment of the soil rather than any one factor such as high or low pH or inadequate irrigation. Control can be effected by restoring the balance in the soil by adding organic matter with or without fertilizer.

1922. MCCLEAN, A. P. D.

Possible identity of three citrus diseases.

Nature, 1950, 165: 767-8, bibl. 5, illus.

Evidence is presented which suggests that a single virus is responsible for xyloporosis, first reported from Palestine, stem-pitting, primarily a disease of grapefruit in S. Africa, and a disease of seedling limes reported from West Africa. A full report is to be published later.—Dep. Agric. Pretoria.

1923. TURRELL, F. M., AND CHERVENAK, M.
Metabolism of radioactive elemental sulfur applied to lemons as an insecticide.

Bot. Gaz., 1949, 111: 109-22, bibl. 89, illus.

This paper presents the results of part of an extensive study that is being carried out at the Riverside Citrus Experiment Station, California, on the causes of sulphur injury to citrus fruits [see also *H.A.*, 13: 1483 and 15: 431]. "By the use of radioactive S(S^{35}) it was determined that a very large proportion of the S in the H_2S formed when lemons are dusted with elemental S and incubated at warm atmospheric temperatures (106° F.) is derived from the S applied. The SO_2 formed in the fruit peel may be derived largely from the S applied if relatively large amounts of S are applied, but the SO_2 formed is derived largely from a source within the fruit. Elemental S vapour penetrates lemons, producing compounds similar to those produced by fruit in contact with elemental S. The area of the S layer from which vaporization occurs and the length of exposure to warm temperatures (106° F.) influence the amount of S products formed by lemons. Radioautographs of the peel of lemons dusted with radioactive S and incubated at 106° F. suggest the incorporation of the S into the tissue proteins." [From authors' summary.]

1924. TURRELL, F. M.
A study of the physiological effects of elemental sulphur dust on citrus fruits.
Plant Physiol., 1950, 25: 13-62, bibl. 89, illus.

This extensive and fundamental work on the physiology of injury to citrus fruit by elemental sulphur dust was initiated as a basis for the development of sulphur insecticides and fungicides, having lower potentially injurious effects during hot weather. As the insecticidal and fungicidal effectiveness of sulphur dusts has increased, injury to plants has also increased. It seems probable, therefore, that the two problems are similar, at least at certain points. The many and complex factors involved in sulphur injury are discussed. It is suggested that the oxidation of elemental sulphur, H_2S and SO_2 to SO_4 may play an important role in sulphur injury, because of the heat liberated in the process. The effect of sulphur in lowering the pH of the tissue of lemons may be another important factor; the pH values attained were often lower than those of the isoelectric points of proteins of the juice. This decrease in pH is interpreted as indicating the formation of H_2SO_4 . Elemental sulphur dust appeared to lower the critical temperature at which citrus fruits are injured by absorption of sunlight.—Citrus Exp. Stat., Riverside, California.

1925. SERVICE DE LA DÉFENSE DES VÉGÉTAUX.
La gommose parasitaire des aurantiacées
Phytophthora parasitica Dastur. (Citrus gummosis.)
Mém. Serv. Déf. Vég. Rabat 35, 3^e édition, 1950, pp. 10.

A general account of gummosis caused by *Phytophthora* species and appropriate control measures.

1926. CHOWDHURY, S.
Foam disease of citrus in Assam.
Curr. Sci., 1950, 19: 62-3, bibl. 6, illus.

Symptoms are described. The cause has not yet been determined, several different fungi being found in diseased material. A coating of bordeaux paste after scraping checked further extension of lesions and stopped exudation of foam completely, although new lesions may develop elsewhere on the same trunk or branch.

1927. BRICHET, J.
La grande maladie des vieux citronniers: la décorticose. (Shell bark disease of old lemon trees.)
Fruits et Prim., 1950, 20: 127-9.

Shell bark disease is prevalent in North Africa among lemon varieties of Mediterranean origin, particularly in trees growing on their own roots or budded on sour orange. Apart from the treatment of infected trees, it is suggested that care should be taken in selecting budwood from clean trees, and that double working be practised using a sweet orange variety or pommelo as intermediate on the sour orange rootstock.

1928. KIELY, T. B.
Black spot of citrus.
Fruit World, Melbourne, 1949, 50: 9: 15.

Black spot is the most serious citrus fruit disease in New South Wales, particularly on Valencia orange. Bordeaux mixture gives good control, and three different spray programmes are suggested. (1) Young trees up to 10 years at 4-4-80 strength applied at petal-fall, at 2-2-80 strength 6-8 weeks later; (2) older trees up to 20 years, 2-2-80 at petal-fall and again 6 and 12 weeks after petal fall; (3) older trees where disease may be difficult to control, 4 weak 1½-1½-80 strength applications at 5-weekly intervals beginning at petal-fall. The first sprays should contain white spraying oil at "sticker" strength, and later sprays oil at scalcidial strength. Bordeaux mixture spray will also control melanose.

1929. MARTIN, J. P.
Effects of fumigation and other soil treatments in the greenhouse on the fungus population of old citrus soil.
Soil Sci., 1950, 69: 107-22, bibl. 30.

Treatment of old citrus and non-citrus soils by steam, leaching, fumigants, fungicides, or insecticides followed by cropping with sour or sweet orange seedlings or with tomatoes, markedly affected the nature of the fungus population of the soil. — After initial destruction or near destruction the fungi re-established themselves, but their kinds and numbers varied. For destroying soil fungi and altering the nature and subsequent fungus population, steam under pressure, fumigation with chloropicrin or D-D, or leaching with 2% H_2SO_4 or with 2% KOH were more effective than fumigation with carbon disulphide, ethylene dichloride, or ethylene dibromide, or than treatment with Dithane or hexachlorocyclohexane, or than leaching with ammonium chloride at pH 4.0. [From author's summary.] All treatments except those with Dithane, hexachlorocyclohexane, and steam resulted in appreciably increased

growth of orange seedlings in old citrus soil and had little effect on growth in non-citrus soils. Dithane, hexachlorocyclohexane, and steam treatment resulted in decreased growth in non-citrus soils.

1930. BAINES, R. C., AND OTHERS.

Hot water treatment of orange trees for eradication of citrus nematode.

Calif. Citrogr., 1949, 34: 482, 484.

In experiments at the California Citrus Exp. Stat., Riverside, on nursery orange trees showing gummosis cankers on their stems caused by *Phytophthora citrophthora* and roots infested by citrus root nematode, *Tylenchulus semipenetrans*, it was found that immersion in hot water at 116° F. for 10 minutes destroyed both causal organisms without injury to the roots. This treatment of bare-root trees proved more practical than the heating of balled trees.

1931. JOHNSTON, C. J. R.

Insect pests of the lemon.

J. Dep. Agric. Vict., 1950, 48: 21-4, 26, illus.

In Victoria the insect pests of lemon generally yield to treatments practised elsewhere, the chief difference being that the lemons in this State will not withstand the application of normal dosages of cyanide when fumigation is carried out against scale insects in autumn and winter, particularly if the soil and foliage are carrying an excess of common salt. The chief pests of lemons in order of importance are: red scale (*Aonidiella aurantii*), olive scale (*Saissetia oleae*), soft brown scale (*Coccus hesperidum*), cottony cushion scale (*Icerya purchasi*), citrus aphids (*Aphis tavaresi* and *Toxoptera aurantii*), larvae of the orange butterfly (*Papilio anactus*), and the light brown apple moth (*Tortrix postvittana*). Of less frequent occurrence are the dark leaf-chewing weevil (*Arammichnus* (*Otiorrhynchus*) *cribricollis*), the elephant borer beetle of orange (*Otiorrhynchus cylindrirostris*), and the auger beetle borer (*Bostrychopsis jesuita*). Cockchafer beetles, caterpillars of the corn earworm moth (*Heliothis armigera*) and longhorned grasshoppers sometimes damage citrus foliage and fruits. California mite (*Tenuipalpus californicus*), and holy cross bug (*Mictis profana*) are minor pests. Recommendations are given for their control.

1932. PLUMMER, C. C., AND SHAW, J. G.

Toxicity of DDT and parathion dusts to the citrus blackfly.

J. econ. Ent., 1949, 42: 708-9, bibl. 2.

Neither 10% DDT dusts nor 1% or 2% parathion dusts killed all the eggs and first-instar larvae of citrus blackfly (*Aleurocanthus woglumi*), but the parathion dusts gave an excellent kill of the second- and third-instar larvae and of the pupae.—U.S.D.A. Bur. Ent. Pl. Quar.

1933. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

Two citrus orchard butterflies (*Papilionidae*).

Agric. Gaz. N.S.W., 1950, 61: 87-9, illus.

Two native species of butterfly, the large (*Papilio aegaeus*) and the small (*P. anactus*) citrus butterflies, have been more numerous than usual this season

(1949-50) and their caterpillars have damaged the younger foliage of citrus trees in various districts. A 0.05% DDT spray (2 fluid oz. of 20% DDT emulsion to 5 gal. of water) may be used to control the caterpillars.

1934. GRIFFITHS, J. T., JR., AND FISHER, F. E.

Residues on citrus trees in Florida.

J. econ. Ent., 1949, 42: 829-33, bibl. 10.

The residue of spray materials appears to result in an increased scale population. Of the 5 sprays used for this experiment (pyrophillite, wettable sulphur, copper + pyrophillite, zinc sulphate + lime + pyrophillite and zinc + lime + copper) those containing zinc-lime or copper showed the most prolonged periods of scale population. An increase of rust mites was also observed following zinc-lime or copper sprays.

1935. SITES, J. W., AND REITZ, H. J.

The variation in individual Valencia oranges from different locations of the tree as a guide to sampling methods and spot-picking for quality. I. Soluble solids in the juice.

Proc. Amer. Soc. hort. Sci., 1949, 54: 1-10, bibl. 8.

The material for this study consisted of Valencia oranges taken from a single tree on rough lemon rootstock growing at the Florida Citrus Experiment Station, Lake Alfred. Analysis showed that fruit with the highest soluble solids was "top outside" fruit, fruit with the lowest soluble solids was "inside" fruit and that from other parts of the tree was intermediate in soluble solids. The percentage soluble solids varied with shading, height of fruit on tree, light exposure and colour of rind. Sampling techniques are proposed for small or large lots of trees.

1936. HARDING, P. L., AND SUNDAY, M. B.

Seasonal changes in Florida tangerines.

Tech. Bull. U.S. Dep. Agric. 988, 1949, pp. 59, bibl. 12, with colour standards chart, 25 cents.

Results are presented with extensive tables and graphs on the periodic analysis of several thousand fruits of the Dancy tangerine over four seasons, 1943-47. Fruit first reached marketable condition about mid-November, when it contained at least 9% total solids and a total solids: total acid ratio of between 8.91 and 7.57 to 1. Prime eating condition was reached in January and February. During ripening there were gradual increases in total solids, pH value and total ash, composed largely of mineral salts, and decreases in total acid and in the solids: acid ratio and in ascorbic acid. Volume of juice and average weight per fruit increased rapidly during the early stages of maturity, remained fairly constant while the fruit was in prime eating condition, and then gradually declined, due mainly to drying out. Changes in colour and thickness of the rind were noted. Changes in colour of the flesh were associated with texture, the flesh of good textured fruit being orange. Comparing fruits grown in different environments it appeared that quality was more affected by rootstock than by soil. Rootstock principally affected total solids and total acid and to a lesser extent juiciness and ascorbic acid. On a basis of taste tangerines on Cleopatra tangerine stock had

the best quality, those on sour orange came next and those on rough lemon third.

1937. ANON.

L'emballage d'exportation. Mise en place des agrumes dans les caisses O.C.E. (Citrus export packs in O.C.E. boxes.)

Fruits et Prim., 1949, 19: 383-92.

L'Office Chérifien de Contrôle et d'Exportation has established 3 standard boxes for the export of citrus from Morocco: O.C.E. No. 1, a slightly modified Florida box for oranges and grapefruit; O.C.E. No. 2, a smaller orange box; and O.C.E. No. 3, a flat box to take 3 layers of mandarins or clementines. The 3 boxes with all the permitted packs are fully illustrated.

1938. U.S. BUREAU OF AGRICULTURAL ECONOMICS.

Citrus preferences among household consumers in Louisville and in Nelson County, Kentucky.

Agric. Inf. Bull. U.S. Dep. Agric. 2, 1950, pp. 91, 25 cents.

It has been estimated that production of citrus in the U.S.A. was two-thirds greater in 1948 than during the period 1935-39. Whereas in 1940-41 about 12% of oranges and 50% of grapefruit in the U.S. were processed, the figures in 1947-48 for the Florida crop were over 50% and about 66% respectively. Surpluses have occurred in both 1946-47 and 1947-48. The detailed survey described in this paper was designed as a pilot study on the preferences of consumers in private households regarding citrus fruits and their products.

Dates.

1939. BLISS, D. E., AND OTHERS.

Date-bunch covers and their relation to the fruit spoilage complex of Deglet Noor dates.

Rep. 26th Annual Date Gr. Inst., Coachella, Calif., 1949, pp. 7-15, bibl. 16, being *Pap. Calif. Citrus Exp. Stat.* 605.

A progress report is given on experiments in the 1948-49 season on two plots of Deglet Noor dates in which comparisons were made between 10 types of bunch cover, 7 being made of paper, 2 of cloth and 1 of a combination of paper and cloth. All bunches, including uncovered controls, were given basic treatments of Thiomate "19" dust and separation of the fruit strands by means of wire rings. No treatment was wholly satisfactory. The cloth covers excluded insects, but not fungi, and were relatively expensive. The paper covers increased sunburning, and lost strength through use, but were generally effective against fungus infection. The most promising covers were a brown and a white paper, both of which had been processed with higher-than-normal rosin size plus Melamine wet-strength treatment and creped to 33½% stretch, but unlike other papers used were not waxed. The brown paper was the cheapest and most durable, and the white gave least injury from sunburn; both gave relatively good disease control. The authors conclude that although the use of improved covers is very important their use must be combined with other protective measures.

1940. MALENÇON, M. G.

Une expérience marocaine de lutte contre les maladies fusariennes. (The control of fusarium diseases in Morocco.)

Repr. C.R. Journées Agric. Nord-Africaine, 1949, 2: 12/14: 13-24.

The author discusses possible measures for controlling the bayoud disease of the date palm [*H.A.*, 4: 474] attributed to *Fusarium albedinis*, and describes trials in which a preparation Cryptonol (neutral sulphate of ortho-oxyquinolene) was injected, as a solution or as a powder, into affected trees. Although only 2% treated trees recovered, the results are considered promising.

1941. LINDGREN, D. L., AND VINCENT, L. E.

Investigations on the life history and control of date insects and the date mite.

Rep. 26th Annual Date Gr. Inst., Coachella, Calif., 1949, pp. 21-4, being *Pap. Calif. Citrus Exp. Stat.* 604.

In the Coachella Valley of California conditions are usually favourable for the rapid build-up in population of nitidulid beetles in dates, viz. *Carpophilus dimidiatus* (Fab.), the corn sap beetle; *C. hemipterus* (L.), the dried-fruit beetle; *Urophorus humeralis* (Fab.), the pineapple beetle; and *Haptonus luteolus* (Er.), the yellowish nitidulid. Laboratory results indicate that gamma isomer of benzene hexachloride, chlordan, parathion, and compounds Nos. 497 and 118, not only give excellent initial kill of the beetles, but also remain toxic to those that may come into contact with any of these materials for several weeks to a month after application. Spraying the date overlay on the ground with gamma isomer of benzene hexachloride in Diesel fuel oil killed the beetles present in the dropped dates but did not keep them out of the bunches. For control of date mite, *Paratetranychus simplex* (Banks), sulphur dust applied thoroughly to each bunch was the most effective of the materials tried.

Papaws.

1942. ALEKSANDROV, A. D.

The papaw. [Russian.]

Priroda (Nature), 1949, No. 10, pp. 68-9.

The medicinal properties of papaw fruits are described. They are rich in sugar and vitamins, and provide the digestive ferment papain. The papaw (*Carica papaya*) was introduced into Russia from Australia in 1947 for observation and propagation at the Soči (Sochi) experiment station. The possibilities of its cultivation in Russia are discussed because of its valuable curative properties which might serve a useful purpose at the Black Sea health resorts.

1943. THOROLD, C. A.

Manurial experiments with papaw (*Carica papaya*).

Trop. Agriculture Trin., 1949, 26: 129-32, bibl. 7.

Four experiments carried out at the St. Augustine Experimental Station, Trinidad, involving NPK and pen manure at different levels and in one case coconut meal, with spacing at 3 ft. × 3 ft. and 6 ft. × 6 ft., are described briefly. Neither planting distance nor fertilizer treatment affected the incidence of mosaic.

NPK significantly increased yields per plant at the wider spacing, as did coconut meal at 5 tons per acre at the close spacing, but response in other cases was not significant. The close spacing may, however, be preferable because of reduced cultivation costs.

1944. MCKNIGHT, T., AND EVERIST, S. L.
Phyllody in the papaw (*Carica papaya*).
Qd J. agric. Sci., 1948, 5: 149-52, bibl. 1,
illus. [received 1950].

During the course of investigations into the virus causing yellow crinkle of papaws [see *H.A.*, 19: 3448] marked development of phyllody has been observed and is here described.

Persimmons.

1945. GUTIEV, G. T.
Subtropical persimmon. [Russian.]
Sad i Ogorod (Orchard and garden), 1950,
No. 1, pp. 39-42.

After tea, citrus and tung, the subtropical or Japanese persimmon, Chinese date plum or kaki (*Diospyros kaki*) is the most important commercial crop of the Soviet humid subtropics. Because of its high resistance to cold and drought it succeeds also in the dry regions of the subtropics, showing more promise there than fig, pomegranate, and olive. Two other species of *Diospyros* grown in U.S.S.R., *D. lotus* and *D. virginiana*, are briefly described. Varieties of *D. kaki* can be divided into 3 groups, viz. (1) those with fruit which, when from fertilized flowers, contain seeds, have brownish flesh and, even when unripe, have no harsh taste; without fertilization (parthenocarpic) seeds are absent and the flesh is yellow-orange when quite ripe, contains soluble tannins and is astringent; the varieties of this group are called "inconsistent" because their taste varies with fertilization; (2) varieties known as "constant" always have a harsh taste; (3) varieties "tanninless" are always yellow-fleshed and are not astringent. The yearly cycle of kaki is described and special reference is made to its frost resistance. It yields well every year, if manured adequately. In the subtropics it is propagated by budding and grafting, but in the newer regions where it is cultivated reproduction from seed offers promise. In the subtropics one-year-old trees are planted at distances of 6 × 6 m. or 7 × 7 m., and in the drier regions 5 × 5 m. or 4 × 4 m. Notes on pruning and manuring are given. Where more than 20° C. of frost are to be expected, young trees should be protected by wrapping with straw. In even colder regions the trees should be planted against the south side of buildings or fences. In prolonged severe winters the stems should have soil piled up round them to a height of 20-30 cm. Raising hybrids more frost and drought resistant, treating and sowing the seed, and the cultivation of the young plants are discussed.

1946. ZAREČKIJ, A. JA.
The Japanese persimmon in central Asia.
[Russian.]
Sad i Ogorod (Orchard and garden), 1950,
No. 1, pp. 42-3.

There are plans for extending the cultivation of the Japanese persimmon [*Diospyros kaki*] in central Asia, particularly in the Uzbek, Tadzhik, and Turkmen

Republics. In these regions it has survived temperatures of -18° to -20° C. At present there is a scarcity of young trees; seedlings imported from the Black Sea coastal regions of Transcaucasus invariably perish. In central Asia budding in spring with buds that have started to grow out has given 81.4% success; the young trees grow well and by autumn attain an average height of 150 cm. The budding should be done when the bark lifts easily from the wood, and this does not occur at the same time in all seedlings of the Caucasian persimmon [*D. lotus*], which is generally used as a rootstock for kaki; in some it is when the buds swell, in others when the first leaves begin to show, and in others again (and this is most general) when the first leaves are expanded. Failures are often a result of imperfect tying. The buds must be without discoloured streaks or dots on the bud-shields. Advice is given on gathering and storing the "bud-sticks"; they should be stored at temperatures of 4-6° C., since at higher temperatures they start to grow out.—South Uzbek Research Station.

1947. SCHROEDER, C. A., AND NORTH, C. P.
Rootstock identification in the persimmon.
Proc. Amer. Soc. hort. Sci., 1949, 54:
154-6, bibl. 5.

Three methods of identification of the 3 species of *Diospyros* are described based on (1) leaf and bud characters of suckers, (2) trunk or bark and bud union characters, and (3) colour reactions of the root bark extract with NaOH.—University of California.

1948. RŽEVKIN, A. A.
Propagating the persimmon. [Russian.]
Sad i Ogorod (Orchard and garden), 1950,
No. 2, pp. 38-9.

In propagating the Japanese persimmon [*Diospyros kaki*] by grafting or budding, the Caucasian persimmon [*D. lotus*] is generally used as a rootstock, rarely the Virginian persimmon [*D. virginiana*], but there are generally relatively few "takes". The operation is usually carried out in the second half of April or in May, the date depending on the region; the disadvantage of spring working is, however, that the scion material must be obtained in February and stored in the cold until the rootstock plants are ready to be grafted, but the buds sometimes begin to develop in those conditions, and the "take" is poor. In experiments at the Nikitsk Botanic Garden, in the Crimea, young seedlings (5½ to 6 months old) budded in October gave 80-90% "take". The author therefore recommends the use of 5-6-month-old seedlings of *D. lotus* as rootstocks for *D. kaki*. Experiments on rooting cuttings from one-year-old shoots of kaki gave negative results even with the application of growth substances. Better results were obtained by ringing shoots growing up from the roots, the ringed part being kept moist with a layer of damp moss wrapped round with paper.

1949. CRANDALL, B. S., AND BAKER, W. L.
The wilt disease of American persimmon,
caused by *Cephalosporium diospyri*.
Phytopathology, 1950, 40: 307-25, bibl. 5,
illus.

A disease of American persimmon, *Diospyros virginiana*, discovered in Tennessee and hitherto unrecorded, is caused by *Cephalosporium diospyri* Crandall. It is

typically a fast-killing wilt characterized by brownish-black streaks throughout the outer annual rings of wilted trees. Removal of all trees showing internal streaking as soon as the first wilting tree is noticed will help to eliminate the disease locally, but cannot protect against reinfection. The fungus is a wound parasite and observations have shown that two species of beetle, *Xylobiops basilaris* (Say) and *Oncideres cingulatus* (Say) were responsible for most of the wounds.

Sweet potatoes.

1950. SEN, B.

Sweet potato.

Indian Fmg., 1949, **10**: 288-92, illus.

Following notes on American experience with regard to composition, sweet potato flour, fodder, starch and other by-products, and grading, storing, and cultivation, preliminary trials at Almora, United Provinces, with U.S. varieties are described. In two areas wide variations were found in the yield and moisture content of roots and tops of 16 varieties. Clear photographs are given of the roots of 7 varieties.

1951. ANON.

Promising sweet potato found on Tinian.

Seed World, 1948, **63**: 7: 18 [received 1950].

A sweet potato found on Tinian Island in the Marianas in 1946 has a higher resistance to the stem rot fungus than any other variety tested by the U.S. Department of Agriculture. It also gives promise of yielding well, so may be valuable commercially as well as for breeding work. At present it is known as P.I.153-655.

1952. WARMKE, H. E., AND CRUZADO, H. J.

Observations on flowering and fertility in some varieties of Jersey and moist-flesh sweetpotatoes.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 391-8, bibl. 15.

Details are given of crosses made between 3 Jersey sweet potato varieties and 17 moist-flesh varieties at the Federal Exp. Stat., Mayaguez, Puerto Rico.

1953. EDMOND, J. B., AND OTHERS.

Cooperative studies on the effects of height of ridge, nitrogen supply, and time of harvest on yield and flesh color of the Porto Rico sweetpotato.

Circ. U.S. Dep. Agric. **832**, 1950, pp. 40, bibl. 16, 15 cents.

From these studies carried out in 4 States of America where the Porto Rico sweet potato is widely grown, the following results were obtained. Total yields and yields of No. 1 and No. 2 grade roots increased as the height of the ridges was increased. Yields of Jumbo (oversize) and cull grade roots were not affected by the height of the ridge. Total yields and yields of No. 1 and Jumbo grades were usually greater where applications of nitrogen were high (48-100 lb. per acre) than where they were low (10-20 lb. per acre). No. 1 grade and total yields increased progressively as harvesting was delayed. Usually more roots were cut during harvest in low-ridged plots than in medium- or high-ridged plots. Height of ridge and nitrogen level had no effect on the flesh colour of the roots, but this improved progressively with delay in time of harvesting; the improvement was maintained during storage.

1954. LUTZ, J. M., DEONIER, M. T., AND WALTERS, B.

Cracking and keeping quality of Porto Rico sweetpotatoes as influenced by rate of fertilizer, nitrogen ratio, lime, and borax. *Proc. Amer. Soc. hort. Sci.*, 1949, **54**: 407-12, bibl. 7.

Neither rate of borax application nor rate of fertilizer had any significant effect on cracking or keeping quality of sweet potatoes in storage. High nitrogen did increase the yield but also increased cracking, so that the marketable yield was not influenced. Lime increased cracking and decreased marketable yield. Both lime and nitrogen had a slightly adverse effect on keeping quality in storage. [Authors' summary.]—U.S. Dep. Agric., Meridian, Miss.

1955. WARREN, G. F.

Sweet potatoes and muskmelons respond to soil fumigation in Southern Indiana.

Down to Earth, 1950, **4**: 4: 16.

In one experiment on each crop at the Southwestern Indiana Horticultural Farm, Johnson, a 50% dichloropropene mixture applied 6 in. deep at 25 gal. per acre gave good control of root-knot nematode and significantly increased yields. 20% ethylene dibromide in a petroleum carrier at 15 gal. per acre was less effective, due possibly to too low a rate of application.

1956. MEULI, L. J., AND SWEZEY, A. W.

Soil fumigation for the control of sweet potato black rot.

Down to Earth, 1949, **5**: 3: 2-4, bibl. 12, illus.

In southern California in 1945 and 1946 EDB (ethylene dibromide) at rates of 2 to 6 gal. per acre gave good direct control of wireworm and root-knot nematode (at the higher dosages) and good indirect control of black rot caused by *Ceratostomella fimbriata*. These results have since been confirmed in commercial cultivation, EDB being usually applied at 3 gal. per acre to crops and 4 gal. to sprout seedbeds [see also *H.A.*, 20: 392].

1957. WEBB, R. E., MILLER, J. C., AND EDMOND, J. B.

Studies of total soluble solids and sugar content in sweet potatoes.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 403-6, bibl. 3.

In studies on freshly dug and stored roots of 10 sweet potato varieties and seedlings at Baton Rouge, Louisiana, no relation was found between total soluble solids and dry weight or between dry weight and total sugars, but a close and highly significant correlation occurred between total soluble solids and total sugars.

Tung.

1958. SITTON, B. G.

The effect of nitrogen, phosphorus, and potassium upon the growth of newly transplanted tung trees.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 22-8, bibl. 6.

Experiments in Louisiana and Mississippi showed the great importance of giving 0.08 to 0.16 lb. P_2O_5 to

newly planted tung trees. N at 0.08 lb. per tree generally helps their growth, unless the soil is already rich in this element. The recommendation of 0.04 lb. K per tree is not based on exact experiment, results in that respect being conflicting.

1959. NEFF, M. S., AND O'ROURKE, E. N., Jr.
Factors contributing to the growth of newly transplanted tung trees.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 40-6, bibl. 5.

Unlike most other plants, transplanted tung trees show two sigmoid growth curves during the first year in the orchard, the first surge of growth being followed by a decline in the growth rate. In studies at Cairo, Georgia, this behaviour occurred in both transplanted and non-transplanted trees. Trees dug and stripped of root and shoot growth during the decline in growth rate resumed active growth on replanting at a time when the undisturbed check trees were still growing very slowly. This indicates that the drop was independent of food reserves in the trees, and to some extent also of the weather. There appeared to be alternate cycles of top and root growth, top growth occurring first, and the prevention of top growth greatly reduced root production. It is suggested that the roots may supply substances essential for top growth, other than water and nutrients, and that the roots also require substances other than organic foods produced in the tops. Under field conditions, however, soil moisture is clearly often the major factor controlling top growth.

1960. BROWN, R. T., AND POTTER, G. F.
Effects of fertilizers applied to cover crops on cover crop yield, on tung trees, and on the yield and oil content of tung fruit.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 53-6, bibl. 2.

Results are given over 3 years for a trial involving various combinations of N, K, dolomitic limestone and manganese sulphate on a sandy loam soil at Irvington, Alabama. The tung trees were 6-year-old seedlings, the cover crop lupins. 24 lb. K₂O per acre applied to the cover crop at planting time in the autumn increased the yield of lupins by 87%, the yield of air-dry tung fruit by an average of 13.6 lb. and of oil by 2.2%. K also hastened maturity and eliminated scorch and premature defoliation. Dolomite had no effect on the yield of lupins, but, especially when applied with N and presumably because it affected uptake of K by the trees, it increased the yield of air-dry tung fruit by 8.4 lb. per tree though reducing the oil content by 0.8%.

Other crops.

1961. HODGE, W. H.
La arracacha comestible. (The edible *Arracacia*.)
Rev. Fac. nac. Agron., Colombia, 1949, **10**: 232-54, bibl. 15, illus.

An account of the history, cultivation and uses of *Arracacia xanthorrhiza*, an umbelliferous plant cultivated mainly in the Colombian Andes for its edible fleshy root-tubers. It is easy to grow, and does well in Colombia in areas where the temperature is 15-18° C. The author suggests that the crop should be more widely grown.

1962. PAL, B. P., AND SINGH, H. B.
Hybrid brinjals [egg plants] give increased yields.

Indian Fmg, 1949, **10**: 378-80, bibl. 4, illus.

In a trial at New Delhi, reciprocal hybrids of the egg-plant varieties Muktareshi and Clustered White outyielded the higher yielding parent by 48.8 and 56.6% respectively. The hybrid, which is long fruited and has been named Pusa Purple, has been distributed to different provinces and reports on its performance have been generally favourable. The technique used in crossing is described with the aid of illustrations.

1963. ALVAREZ GARCÍA, L. A.
The control of *Rhizoctonia* damping-off of pepper and eggplant in Puerto Rico. [Spanish summary.]

J. Agric. Puerto Rico, 1946, **30**: 69-96, bibl. 16 [received 1950].

A series of studies over 3 years is described. Among several organisms isolated and tested in inoculation trials, *Rhizoctonia solani* appeared to be chiefly responsible for damping-off, especially during the first 3-7 days after emergence. There were significant differences in varietal susceptibility among both sweet and hot peppers but not among eggplant varieties. Soil sterilization by steam and formaldehyde proved effective, but to minimize the chance of re-infection a soil application of bordeaux mixture 4-4-50 at $\frac{1}{2}$ gal. per square foot is suggested during the first week after emergence. Among a large number of fungicides tested as seed and soil treatments several mercurial and copper compounds gave effective control.

1964. SCHROEDER, C. A.
The feijoa in California.
Fruit Var. hort. Dig., 1949, **4**: 99-101, illus.

A hardy, evergreen, subtropical ornamental plant with a pleasant tasting fruit. Of the three more widely planted varieties Coolidge is the best known, while Choiceana and Superba are also of high quality.

1965. EVREINOFF, V. A.
Hovenia, *Hovenia dulcis* Thunberg. (The Japanese raisin-tree.)
Fruits et Prim., 1950, **20**: 8-9, illus.

The swollen peduncles of the fruits have a very high sugar content and are either eaten raw or used in confectionery. Propagation can be effected by seed or cuttings, and as the tree is not particular as to environment it is suggested that it might be worth cultivating in north Africa.

1966. EVREINOFF, V. A.
Le jububier. (The jujube.)
Fruits et Prim., 1949, **19**: 339-41, illus.

Essentially the same article as that noted in *H.A.*, 18: 633. Among points covered are soil and climatic requirements, varieties, multiplication by seed, cuttings and grafting, inter-planting with other fruit trees, cultivation and picking and packing.

1967. HAMILTON, R. G., AND TOPPING, E.
Tree tomato culture.
Bull. N.Z. Dep. Agric. **306**, revised 1949, pp. 18, bibl. 4, illus.

The tree tomato, *Cyphomandra betacea*, is becoming increasingly popular in New Zealand, and there are now about 170 acres under cultivation in the frost-free areas of Auckland Province, where an average crop is about

400 bushels per acre per annum. This bulletin gives advice on the selection of sites, varieties, propagation, extraction of seeds, nursery beds, spacing, planting, maintenance, pruning, the control of diseases and pests, and harvesting and packing, using three types of case. The junior author is responsible for a section on tree tomato recipes.

Noted.

1968.

- a ARMITAGE, H. M.
The oriental fruit fly from the mainland viewpoint.
J. econ. Ent., 1949, **42**: 713-16.
- b CURTIS, D. S., CHAPMAN, H. D., AND ZENTMYER, G. A.
Résumé of investigations concerning the oxygen requirements of avocado seedlings including a study of interrelations to nitrite and *Phytophthora cinnamomi*.
Yearb. Calif. Avocado Soc. for 1949, pp. 155-65, bibl. 30, illus.
See *H.A.*, 19: 2395, 20: 1017 and 1896 for the original articles on which this résumé is based.

- c DEBACH, P., FLESCNER, C. A., AND DIETRICK, E. J.
Population studies of the long-tailed mealybug and its natural enemies on citrus trees in Southern California, 1947.
J. econ. Ent., 1949, **42**: 777-82, bibl. 3.
- d PY, C.
Le "quick decline" en Californie. (Quick-decline [of citrus] in California.)
Fruits d'outre mer, 1950, **5**: 82-8, illus.
- e SMITH, H. S.
Organization and objectives of the fruit fly work in Hawaii.
Calif. Citrogr., 1950, **35**: 99, 128-9.
- f WOLFENBARGER, D. O.
Tests of some newer insecticides for control of subtropical fruit and truck crop pests.
Florida Ent., 1947, **29**: 37-44, illus., bibl. 4, from abstr. in *Rev. appl. Ent.*, 1950, **38**: 80-1.

TROPICAL CROPS.

General.

(See also 1880, 2137, 2146, 2154, 2157-2160, 2162, 2169, 2174, 2176.)

1969. AHMAD, N.
The physiography and crops of eastern Pakistan.
Agric. Pakistan, 1949, **1**: 12-17.
Amongst crops in East Bengal, acreages and total yields are given for sugar cane, betel nuts, tobacco, tea and coconuts.
1970. CHAVAN, V. M., AND BHAT, N. R.
Increased production of pulses through breeding, introduction and cultural methods.
Poona agric. Coll. Mag., 1949, **40**: 3: 18-28, bibl. 24.
A general review of the literature with special reference to Indian problems. Pulses under cultivation in India are listed with local as well as English and botanical names.
1971. FOCAN, A.
Résultats des essais de fumure minérale au Congo belge. (Results of fertilizer trials in the Belgian Congo.)
Bull. agric. Congo belge, 1950, **41**: 73-104, bibl. in text.
Among crops mentioned in a general review of fertilizer experiments carried out by I.N.E.A.C. are the following: Pyrethrum at Mulungu showed a very marked response to potash. Responses of arabica coffee at Nioka and Mulungu have been negative, as have the responses of cinchona at Tshibinda. With sisal, micro-plot tests at Gimbi suggest that fertilizers including lime will have a good effect. With oil palms at Yangambi, phosphates had a depressing effect in the first trials, and the only favourable response was to organic

manure; more recent experiments suggest, however, that certain forms of fertilizer will produce yield increases.

1972. HARDY, F.
Phosphate deficiency in some West Indian soils as revealed by pot tests.
Trop. Agriculture Trin., 1949, **26**: 85-92, bibl. in text, illus.

Pot tests, using tomatoes as indicator plants, supported by laboratory analyses, demonstrate, on the whole, a remarkable deficiency of available phosphate in West Indian volcanic soils, and a marked response to generous dressings of phosphatic manure, provided that abundant nitrogen is also present in available form or added as manure.

1973. BERWICK, E. J. H.
Mechanical cultivation of coastal clays.
Malay. agric. J., 1949, **32**: 288-97, bibl. 10, illus.

A preliminary report is given on investigations started at Port Swettenham, Selangor, in 1948 on the use of mechanical cultivation in low-lying, heavy but relatively fertile soils. Heavy equipment used included mole drainers, Killefer and Cuthbertson ditchers, angledozers, chisel cultivators, disc ploughs and disc harrows, drawn by crawler tractors. Areas involved were both open and under tree crops, particularly coconuts. No final conclusions can yet be drawn, but it is clear that heavy equipment can be used on such land for not more than 2 to 3 months in the year, and that it is essential for drainage to be maintained throughout the period of cultivation. The work confirms earlier findings that lalang can be eradicated without difficulty by disc ploughing, especially under shade.

1974. TALGERI, G. M.
Recent developments in the insecticidal control of certain important insects injurious to fruit crops in the Bombay Province.
Poona agric. Coll. Mag., 1949, 40: 3: 39-46.
The use of DDT and/or BHC is described for controlling various pests of mango, citrus, pomegranate and guava.
1975. O'CONNOR, B. A.
Some insect pests of Tonga.
Agric. J. Dep. Agric. Fiji, 1949, 20: 47-57, bibl. 17.
Pests identified on a visit to Tonga in 1949 include the coconut stick insect, *Graeffea crouani*, controllable by grease bands incorporating DDT; the banana scab moth, *Nacoleia octasema*, whose larvae damage the fruit and for the control of which DDT dusting seems promising; the banana weevil borer, *Cosmopolites sordidus*, controllable by planting clean suckers, hygiene and the use of poison bait; fruit flies, *Dacus* spp., on citrus, for which a HETP bait is suggested. Pests of the following crops are also mentioned briefly: Tahitian chestnut (Ifi), *Inocarpus edulis*, avocados, pineapples, cacao, coffee, tobacco, sweet potatoes and several vegetables and ornamentals.
1976. CAPINPIN, J. M., AND REAÑO, M. C.
Inducing morphological variations in crop plants with poisonous plant extracts.
Philipp. Agric., 1949, 32: 305-11.
Seeds of two legumes, two cereals, and three solanaceous vegetables were soaked for various periods in bark extracts of *Lophopetalum toxicum* prepared in 4 different ways and root extracts of *Rourea erecta*. Extracts of *L. toxicum* did not affect germination of cereals or legumes, but induced morphological variations in seedlings of the latter. Extract of *R. erecta* reduced and delayed germination in the legumes and produced stunted seedlings with swollen stems, all but one of which soon died; the exception had stomata of abnormal size and was a polyploid variant. With the solanaceous vegetables, extract of *R. erecta* reduced germination but had no other effects.
1977. CHAUVIN, R., AND CUILLE, J.
L'utilisation des "attractifs" et des "répulsifs" pour la lutte contre les insectes nuisibles. (The use of baits and repellents for the control of insect pests.)
Fruits d'outre mer, 1950, 5: 13-17, bibl. 9, illus.
A brief review is given of the literature on baits and repellents; it includes mention of traps for banana borers and fruit flies.
- Bananas.**
1978. CHEESMAN, E. E.
Banana research at I.C.T.A.
Trop. Agriculture Trin., 1949, 26: 78-84, bibl. 24.
A review is given of botanical investigations on bananas at the Imperial College of Tropical Agriculture, Trinidad, between 1922 and 1946. The immediate object of the work was the production of a commercial banana combining resistance to certain diseases with suitability for the export trade. Simultaneously, the long-range objective was to obtain such knowledge of the origins, relationships, and genetic systems of the group as will facilitate banana breeding in general in case new needs for it arise. Initially the methods used were largely empirical, but the information so obtained has finally permitted analysis of the problem and formulation of a more scientific programme, in which studies of polyploidy, parthenocarpy and sterility in wild and cultivated forms have been integrated to the desired end.
1979. GUHA, M. P.
Fruit for the millions.
Indian Fmg, 1949, 10: 330-6, bibl. 12.
The banana and plantain cover about 20% of the total fruit acreage in India, only being exceeded in acreage by the mango. A brief description is given of their distribution, food value, cultivation and control of diseases and pests, and the more important local varieties are listed.
1980. RODRIGUES, A., AND DE SOUSA, A. T.
Sobre a época de selecção dos rebentos da bananeira (*Musa nana* Lour.), na ilha da Madeira. (On the time of selection of banana suckers in the island of Madeira.)
[English summary 4½ lines.]
Agron. lusit., 1947, 9: 193-248, bibl. 6, illus. [received 1950].
The work aimed at determining, for Madeira, the most suitable season for selecting banana shoots for propagation. The development of shoots chosen at different times and the harvest dates were recorded. Shoots taken from September to April gave better results than those taken from May to August.
1981. EASTWOOD, H. W.
The propagation of banana plants.
[Publ.] N.S.W. Dep. Agric., Div. Hort., 1948, pp. 12, illus. [received 1950], reprinted and abbreviated in French in *Fruits d'outre mer*, 1949, 4: 332-6, illus.
Various types of planting material, suckers, butts, pieces and eyes, are described. Suckers are most commonly used, but these should be of the right type, so-called "spearhead" suckers or "sword-suckers" with large bulbs tapering to a point. Offsets of the types known as "umbrella" and "water" suckers and "onion bulbs", which are most commonly produced in aged or devitalized plantations, should never be used. These various types of sucker are illustrated, and methods of digging described and compared with the process of removing surplus suckers not required as followers or as planting material. Regulations are in force to prevent the movement of diseased material, but the author suggests further conditions of sale, as between one grower and another, covering the type and quality of planting material.
1982. MERNY, G.
Traitements contre *Cercospora musae* à la Jamaïque. (Control measures against banana leaf spot in Jamaica.)
Fruits d'outre mer, 1950, 5: 89-92, illus.
Observations arising from a visit to Jamaica with reference to the possible adaptation of spraying

methods in use there to conditions in the French West Indies.

Cacao.

1983. VOELCKER, O. J.

W.A.C.R.I. 1944-1949.

[*Mim. Publ.*] *West Afr. Cacao Res. Inst.*, 1950 (?), pp. 16.

The first 5 years' work of the West African Cacao Research Institute is here summarized by its Director. He points out that the overall programme of research was, and still is, based on three main problems: (1) Investigations into diseases and pests, notably swollen shoot and capsids, and the evolution of control measures. (2) Investigations into soil fertility and agricultural practice with a view to increasing the yield and life of cacao trees. (3) The search for improved varieties. Details of the progress made have appeared in annual reports [see abstract 2174, and in earlier vols. of *H.A.*], but the present paper provides a useful summary of the position, and sets a useful precedent.

1984. HOLDRIDGE, L. R.

Notes on the native and cultivated cacaos in Central America and Mexico.

Cacao Inf. Bull., 1950, 2: 1: 1-5, bibl. 4.

Nine species of *Theobroma* found in Central America and Mexico are described briefly with the aid of a key: *T. bernoullii*, *T. asclepiadiflorum*, *T. simiarum*, *T. purpureum*, *T. mammosum*, *T. angustifolia*, *T. bicolor*, *T. pentagona* and $\times T. cacao$. Regarding the last named, the author questions the right to consider it to be a valid species, and suggests that the so-called Criollo cacaos of Central America are in fact hybrids between native *T. pentagona* and *T. leiocarpa* introduced from South America.

1985. BOWMAN, G. F.

Development of superior clonal plantations of cacao.

Cacao Inf. Bull., 1949, 1: 20: 1-4.

An account is given of the procedure adopted by the Inter-American Cacao Center, Turrialba, Costa Rica, for selection, progeny planting, testing and multiplication.

1986. ESCAMILLA, G., PAREDES, A., AND VON BUCHWALD, A.

Propagation of cacao: Methods and problems. Vegetative propagation of cacao. The experimental propagation of cacao. Cacao propagation by cuttings.

Cacao Inf. Bull., 1948, 1: 14: 1-2; 1949, 1: 15: 2-3, 16: 3-4, 17: 2-4.

Extracts are given from a monograph submitted by three students at Turrialba. The first two articles are concerned with methods evolved elsewhere, the last two with various experiments from which the following points are taken: *Propagation by seed*: Skinning the seeds resulted in quicker germination and a higher total percentage germination. *Patch budding* [see abstract 1987]. *Other methods of grafting*: Cleft and whip grafting and shield budding all failed. Horizontal H buds and ring buds gave some success, but were too laborious. *Cuttings*: Small-scale trials with clones difficult to root gave generally poor results, except

where cuttings with half and quarter leaves were set in a box with a cello-glass cover, the rooting medium being soil with a 10 cm. capping of organic material. No cuttings without leaves rooted.

1987. PAREDES, L. A.

Propagation of cacao by budding.

Cacao Inf. Bull., 1949, 1: 21: 5.

A summary is given of a thesis submitted at the Cacao Center, Turrialba, Costa Rica. The main recommendations are: Preparation of bud sticks 8 days before their removal from the trees, use of an inverted U incision with a rectangular patch bud, and decapitation of the stock at the time of budding less than 10 cm. above the bud. *Theobroma simiarum* and *T. bicolor* were tried as stocks, but without success.

1988. KEEPING, G. S.

The vegetative propagation of cocoa.

Malay. agric. J., 1950, 33: 27-31, bibl. 8, illus.

In a small trial with the modified Forkert system of patch budding, unpetaioled budwood produced 44% matured plants after 3 months and petioled budwood 38%, though the latter grew out rather more quickly. In another small trial with cuttings in bins, on the lines suggested by Pyke in Trinidad, chupons showed 81% strike, fans 95% and a mixture 75%.

1989. GOODALL, D. W.

Growth analysis of cacao seedlings.

Ann. Bot. Lond., 1950, 14: 291-306, bibl. 5.

The growth of cacao during the first 30 weeks after planting was studied by taking samples of seedlings at intervals of 6 weeks. The fresh weight and dry weight of each organ was determined, and also the area of each leaf. The mean relative growth rate of all plants between 6 weeks and 30 weeks after planting was 1.29% per day. Largest gain in dry matter occurred in roots and young leaves; the proportion of this gain occurring in the stems increased, while that in the older leaves decreased but remained positive. Distribution of water agreed in general with that of dry matter, but the older leaves were losing water while still gaining in dry matter. A decline in the percentage of water-content was observed in the whole plant, particularly the roots, between its 6th and 24th week from planting. —West African Cacao Res. Inst., Tafo, Gold Coast.

1990. GREENWOOD, M., AND POSNETTE, A. F.

The growth flushes of cacao.

J. hort. Sci., 1950, 25: 164-74, bibl. 14.

Daily observations during 1938-39 on 64 mature cacao trees scattered among 60 acres of cacao at Tafo, Gold Coast, indicated that overhead shade influences the growth flushes of cacao. Weekly observations on flushing were taken from 1939 to 1946 on three shaded and three unshaded plots. During part of this period records were taken of evaporation rate, soil moisture, sunshine and temperature on one shaded and one unshaded plot. Screen temperatures were recorded throughout the period. It was found that unshaded mature cacao flushed more frequently and with greater intensity than shaded cacao, and that this difference was more marked during periods of low temperature. The results indicate that the flushing of mature cacao is suppressed when the weekly mean of the daily maximum temperatures is below 83° F., and that no

other environmental factors measured influence flushing. Young cacao seedlings show regular periodic growth and, up to at least one year old, their flushing seems to be independent of temperature. [Authors' summary.]

1991. CABRERA, L.

Shade and the concentration of stomata in the cacao plant.

Cacao Inf. Bull., 1949, 1: 22: 6-7.

A summary is given of a thesis submitted at the Cacao Center, Turrialba, Costa Rica. Nursery plants were subjected to shade intensities of 90%, 50%, 25% and nil, and leaves from the top, centre and bottom of each plant examined. Under 90% and 50% shade there was no significant difference in the number of stomata per unit area, but with less shade numbers of stomata became progressively lower. Similarly old trees under shade had more stomata per mm² than trees in the open. Sizes of stomata became smaller the greater the intensity of shade. Nursery trees with 50% shade made the best growth.

1992. POSNETTE, A. F.

The pollination of cacao in the Gold Coast.

J. hort. Sci., 1950, 25: 155-63, bibl. 17, illus.

Studies made at W.A.C.R.I., Tafo, Gold Coast, in 1946-48 are described. Insects found to be responsible for much of the cross-pollination of cacao were identified as *Forcipomyia ingrami* Carter, *F. ashantii* Ingram & Macfie and *Lasiohelea litoraurea* Ingram & Macfie. By the use of a recessive character, "albinoism", to indicate self-pollinated progeny, and a dominant character, red pigmentation at the junction of petiole and stem, to identify crossed progeny, the incidence of cross-pollination was found to vary between 18% and 43%. Cross-pollination occurred between trees two rows apart but less frequently than between adjacent trees. Double pollination by different pollen parents was shown to occur, a second application of pollen effecting some fertilization up to 6 hours after the first. The design of clonal plots planted for seed distribution is discussed with regard to pollination factors.

1993. HUMPHRIES, E. C.

Wilt of cacao fruits (*Theobroma cacao*).

V. Seasonal variation in potassium, nitrogen, phosphorus, and calcium of the bark and wood of the cacao tree.

Ann. Bot. Lond., 1950, 14: 149-64, bibl. 5.

Seasonal changes over 14 months in K, P, N, and Ca were followed in the bark and wood of the cacao tree at levels of 1 ft., 6 ft. and 12 ft. from the base of the trunk. K and P showed significant variations in bark and wood, but N and Ca in bark only. A negative gradient of Ca in the wood, decreasing markedly towards the end of the dry season, indicated that uptake of soil solutes practically ceased at the height of the dry season. There were negative gradients of K and total N and non-carbohydrate alcohol-soluble material between 1 ft. and 6 ft. and positive gradients between 6 ft. and 12 ft. It is assumed that the former is predominantly a structural and storage gradient and the latter a dynamic transport gradient. K was found to be depleted by seasonal increase in crop, whereas the correlation between K and crop at an instant was

positive, indicating that K limits crop size. [See also *H.A.*, 13: 599; 14: 1348; 17: 1716.]

1994. GOODALL, D. W.

Virus diseases of cacao in West Africa.

IV. Effect of virus infection on growth and water content of cacao seedlings.

Ann. appl. Biol., 1949, 36: 440-7, bibl. 13.

Cacao seedlings, apparently healthy, were compared with those infected before planting with "swollen shoot" viruses. The leaf area and the fresh and dry weights of each organ were measured. Infected plants were lower in dry weight, leaf area, relative growth rate and net assimilation rate; a smaller proportion of the dry matter was in the leaves and lateral roots, a larger proportion in stems and tap roots. Infection caused extensive necrosis of the lateral roots, and reduced the rate of depletion of reserves in the cotyledons and the water content of the plant. Many of these effects were apparent within a month of infection and planting. [Author's summary.]—West African Cacao Research Institute, Tafo, Gold Coast.

1995. MEIFFREN, M.

Swollen shoot, maladie du cacaoyer.

(Swollen shoot disease of cacao.)

Agron. trop., 1949, 4: 563-78, bibl. 43, illus.

Studies on "swollen shoot" of cacao made by W.A.C.R.I., Tafo, in the Gold Coast and on a somewhat smaller scale in the Ivory Coast are described and compared in some detail. So far, in the latter, the disease is less widespread and the more virulent forms of the virus appear to be absent, hence control by isolating and destroying infected trees is easier. The review covers such aspects as symptoms, mainly of the mosaic types in the Ivory Coast (shown in a series of photographs), the interrelationships between different strains of virus, alternate host plants, transmission by insects and mechanical means, variations in the resistance of different clones to infection, and the destruction of diseased trees. In conclusion the author considers that early efforts should be made to build up a complete collection of cacao types from which selections, based on yields, precocity and resistance to diseases, can be made and multiplied vegetatively.

1996. NICOL, J., OWEN, H., AND STRICKLAND, A. H.

Biological control of the mealybug vectors of swollen shoot virus of cacao.

Nature, 1950, 165: 490, bibl. 2.

After preliminary laboratory tests had shown that spores of *Aspergillus parasiticus* kill *Pseudococcus njalensis*, the chief vector of swollen shoot in the Gold Coast, the experiments were repeated under conditions approximating to those of field conditions. Each treatment involved the application of 0.25 g. of talc dust, containing about 12,000 fungus spores, to 100 adult mealybugs. Mortality after 96 hours varied from 90% to 97% as compared with nil in the controls. —West African Cacao Res. Inst., Tafo.

1997. RISBEC, J.

Les parasites des *Pseudococcus* du cacaoyer, vecteurs du *swollen shoot* en Côte d'Ivoire. (The parasites of cacao mealybugs, the vectors of swollen shoot in the Ivory Coast.) *Agron. trop.*, 1949, 4: 578-81.

Four species of *Encyrtidae*, collected by the Cacao Station at Abengourou have been identified as *Lepomastix longipennis*, *Anagyrus subproximus*, *Achrysophagus aegyptiacus*, and *Coccophoctonus abengouroui* n.sp. The last named is described in some detail, the others briefly.

1998. HERNÁNDEZ, M. S.

Phytophthora pod rot of cacao.

Cacao Inf. Bull., 1949, 1: 16: 1, 1: 17: 1-2, 1: 18: 4.

A review of the problem and of studies on factors influencing dissemination indicate that infection is not airborne. Application of bordeaux mixture is the most effective method of control.

Cinchona.

1999. LIENART, J.-M.

Essai de détermination de clones de *Cinchona Ledgeriana* au moyen des caractères foliaires. (The identification of clones of *C. ledgeriana* by means of leaf characters.)

Bull. agric. Congo belge, 1950, 41: 57-68, illus.

It is suggested that certain leaf characters can be used to identify ledgeriana clones, and the leaves of clones M.23, 69, 86, 96, 141, 143, 228 and 278 are described with the aid of diagrams.

Cloves.

2000. NUTMAN, F. J., and SHEFFIELD, F. M. L.
Studies of the clove tree. I. Sudden-death disease and its epidemiology.

Ann. appl. Biol., 1949, 36: 419-39, bibl. 19, illus.

Sudden-death disease of cloves has been present and steadily increasing in both Zanzibar and Pemba for many years. The only premonitory symptom is a slight chlorosis followed by thinning of the foliage and reduction of the absorbing system. Death follows in from a few days to many months, from lack of water caused by the disorganization of the absorbing roots. The outbreaks are (1) sporadic, ceasing to spread after killing a few trees; (2) the "Pemba" type showing clear peripheral spread; or (3) the diffuse epidemic type. Of the possible pathogens, a virus carried by a lethargic vector is the most probable, and a scale insect is suspected which is tended and transported by the red tree-ant, *Oecophylla longinoda*.—Clove Research Scheme, Zanzibar.

Coconuts.

2001. GOPALAN, K., and VENKATARAMAN, M. S.
Studies in the cost of cultivation of coconuts in Cochin State.

Indian Cocon. J., 1949, 2: 135-44, 194-203.

The acreage under coconuts in Cochin State is estimated at 64,928, with average annual yields of about 2,000 nuts per acre. Costs per acre are tabulated and discussed for 10 representative areas with above average yields in 1940, 1945 and 1948 under two main headings: (1) Cost of bringing trees into bearing, including the cost of the land, and (2) Cost of maintenance including

cultural operations, harvesting, etc. In 1940 average costs of production, allowing for payment of interest, etc., worked out at Rs. 31/3 per 1,000 nuts and average price at only Rs. 26/4; in 1945 the respective figures were Rs. 69/- and Rs. 103/9 and in 1948 Rs. 80/10 and Rs. 137/9.

2002. JOHN, T. J.

How to save the coconut palm from the effects of drought.

Bull. Indian centr. Cocon. Cttee, 1950, 3: 75-7, bibl. 1.

Three methods of improving soil moisture during the dry season are described: (1) At Kasaragod breaking the surface by ploughing at the outset of the dry season increased the soil moisture content at all levels down to 6 feet. (2) Burying husks with the fibrous face up in trenches 6 ft. wide by 2 ft. deep between rows of palms. (3) Adding organic matter. An experiment is cited in which the effects on soil moisture of a ploughed-in green manure crop were as good as, if not better than, those of cattle manure.

2003. ANON.

Green manure for coconut trees.

Bull. Indian centr. Cocon. Cttee, 1949, 3: 47-50, bibl. 3.

Plants suggested as green manure crops are cow peas, sunnhemp, daincha and wild sunnhemp, *Crotalaria striata*. The last named is commonly found as a weed under coconuts and seed is being distributed; a self-sown crop at Kasaragod yielded about 20,000 lb. of green manure per acre.

2004. SALGADO, M. L. M.

The relation between soil types and manuring.

Ceylon Cocon. Quart., 1950, 1: 23-6.

A general account is given of the main coconut soil types in Ceylon and their need for potash or phosphates indicated.

2005. COOKE, F. C.

The tapering disease of coconuts.

Ceylon Cocon. Quart., 1950, 1: 17-21.

Tapering or pencil-point disease of coconuts is being investigated by the Coconut Research Scheme. It has been found to affect palms in full bearing under a wide range of environmental conditions. There is no evidence of a pathogen, and preliminary observations suggest that it may be the result of a nutrient deficiency, possibly of magnesium. NPK fertilizers have not checked the disease, but affected palms may be saved by a heavy dressing of cattle manure at an early stage of the disease, possibly through the stimulation of new root growth.

2006. MARTYN, E. B.

Further observations on the "unknown disease" of coconuts.

Trop. Agriculture Trin., 1949, 26: 110-12, bibl. 5.

The history and possible nature of the "unknown disease" of coconuts in Jamaica are outlined. Evidence is presented that the disease is of an infectious nature, and experiments are now in progress to determine how it originates.

2007. MENON, K. P. V., AND NAIR, U. K.
The wilt (root disease) disease of coconuts
in Travancore and Cochin.
Indian Cocon. J., 1949, 3: 5-10, 40-4,
bibl. 18.

Symptoms of wilt, the most important disease of coconuts in Travancore and Cochin, are described and compared with those of similar diseases reported elsewhere, e.g. bronze leaf wilt and the "unknown" disease in the West Indies. In a series of isolations from roots of diseased trees in Travancore the following organisms were found: *Botryodiplodia theobromae*, *Rhizoctonia bataticola* (*Macrophomina phaseoli*), *R. solani*, *Fusarium* sp. and *Penicillium* sp. and two species of bacteria. In a series of inoculation experiments described briefly, wilting of the leaves of young seedlings in some cases followed inoculation with the first 3 fungi listed above. When the plants had previously been subjected to two days' waterlogging the inoculated plants died about two months later. Among unsuccessful methods of transmission was the application of soil from the roots of diseased trees to the soil around healthy palms. From soil analyses of infected areas it would appear that a low or ill-balanced nutritional status, particularly deficiency of potash, is a predisposing factor. The relationship between soil conditions and disease is to be discussed in a later paper.

2008. LEACH, R.
Nutfall in the Solomons.
Indian Cocon. J., 1949, 3: 35-9, reprinted
from *Progress*, 1949, No. 233.

An account of a study undertaken with B. A. O'Connor whose article on the same subject was abstracted *H.A.*, 20: 401.

Coffee.

2009. FEDERACION NACIONAL DE CAFETEROS DE COLOMBIA.
Centro Nacional de Investigaciones de Cafe.
(The national centre for coffee investigations.)
[*Publ.*] *Fed. nac. Cafeteros, Caldas, Colombia*, 1950, pp. 28, illus., maps.

Nearly 100 field trials and studies being carried out by the national centre for coffee investigations in Colombia are listed. These are mainly concerned with the cultivation of coffee, in particular soil conservation, cover cropping and shade problems, although a few experiments on other local crops such as pineapples, cassava and agave are included. In some cases preliminary results are recorded.

2010. HAARER, A. E.
Development of East Africa's coffee industry.
Crown Colon., 1950, 20: 91-4, illus.

This general account of the coffee industry in Uganda, Kenya and Tanganyika covers such aspects as production trends, the development of native co-operative societies, methods of cultivation and pruning, shade, varieties, and the establishment of the Coffee Research Station, Lyamungu, in 1934. The author regards the main achievements of this Station to be the demonstration of the values of mulching and of the multiple-stem pruning system, and the successful propagation of

arabica coffee by cuttings as a prelude to the establishment of selected clones.

2011. FERWERDA, F. P.
El cultivo del café en la Indonesia. (Coffee growing in Indonesia.)
Hacienda, 1949, 9, abstr. in *Bol. Informativo, Colombia*, 1950, 6: 12-14.

Methods of pruning, soil conservation, cover cropping and shading practised in the coffee plantations of Indonesia are outlined. *C. robusta* is the species most widely grown. Mention is made of investigations carried out at the Experimental Station of Desuki, in which it was shown that the growth of coffee trees was inhibited by root excretions from *Salvia occidentalis*, a plant sometimes used as a cover crop.

2012. PATTABHIRAMAN, T. V., AND GOPALAKRISHNAN, K. S.
Use of urine extract in vegetative propagation of coffee.
Indian Coff. Bd mon. Bull., 1950, 14: 39-41, bibl. 4.

In a single experiment alcohol extract of cows' urine promoted better rooting of single node robusta sucker cuttings than did indolebutyric acid, phenylacetic acid or Hortomone A.

2013. MORRIS, R. C.
Grevillea robusta compacta.
Indian Coff. Bd mon. Bull., 1950, 14: 12.

G. robusta compacta, apart from difficulties of propagation, should be much more suitable as a shade tree for coffee than the common *G. robusta*, because it does not drop its lower branches and it has a lighter leaf-fall during the S.W. monsoon.

2014. VAN SEVEREN, M. L.
Salvador's coffee farms discard old practice.
Foreign Agric., 1950, 14: 98-9.

The practice, in El Salvador, of combining clean cultivation with "abono" holes (pits about 3 ft. x 3 ft. x 3 ft., dug a yard from the base of the coffee tree and filled with vegetable debris) is being abandoned in favour of mulching. At the Centro Nacional de Agronomía mulching increased yields by 100%.

2015. THOMAS, K. M.
Whither manuring?
Indian Coff. Bd mon. Bull., 1950, 14: 26-8, 36-9, bibl. 7.

Results of several earlier manurial trials are discussed and yields over 9 years tabulated for an NPK trial on uniform seedlings at the Coffee experimental station, Balehonnur, and for a duplicate experiment on bearing estate coffee. In the former no significant differences occurred in 6 out of the 9 years, but the average over the whole period showed a significant increase in yield for complete NPK over the untreated control but not over other fertilizer treatments; this increase was not, however, economic. In the estate trial there were no responses in 7 out of the 9 years. The tentative conclusion is reached that coffee tends to respond to N, but that the amount used in these experiments, 20 lb. per acre, may be wholly inadequate for the coffee-shade combination found in S. India.

2016. GÓMEZ, L. A., LERÍA ESMORIS, J., AND CAPÓ, B. G.
Fertilizer requirements of coffee grown on catalina clay in Puerto Rico. [Spanish summary.]
J. Agric. Puerto Rico, 1946, 30: 127-37, bibl. 2 [received 1950].

In an experiment with the Puerto Rican variety of *Coffea arabica* over 9 years at Lares there were yield responses to N and P, but not to K. With N, responses in the first 6 years were not significant, but over the whole period they were. In a second trial over 3 years at Mayaguez there was response to P only. These results are in contrast with those obtained earlier on other soil types where K and not P proved essential for maximum production.

2017. MAYNE, W. W.
Some reflections on the problem of black-bean.

Indian Coff. Bd mon. Bull., 1950, 14: 13-16.

The development of the coffee seed after fertilization is described with reference to distinct anatomical features found in black and spotted beans. There is evidence that the cause is a physiological disorder, and it is suggested that the possibility of hormonal disturbances should be investigated.

Fibres.

(See also 1805.)

2018. BERKLEY, E. E., AND OTHERS.
A study of the quality of abaca fiber.
Tech. Bull. U.S. Dep. Agric. 999, 1949, pp. 56, bibl. 12, illus., 20 cents.

Two varieties of abaca fibre grown in Central America were sampled to determine fibre properties for different heights in the plant, different areas of the cross section, and different methods of drying. The variety Bungulanon had significantly greater strength than Maguin-danao. In tall plants little difference was found in fibre properties in the first 10 feet, but near the top the fibre deteriorates. Short, stunted plants grown with inadequate shade showed a marked reduction in physical properties with height in the plant above the first 4 or 5 feet. In cross section the greatest fibre strength was found in the streaky sheaths, somewhat less in the outer brown sheaths and in the ochre or cream-coloured sheaths just beneath the streaky, and least in the white fibre near the centre. No consistent differences were found between sun-dried and machine-dried fibre.

Cleaning by two different methods, on hagotan (hand operated) and raspador machines, was compared, using 2 varieties of abaca fibre from Panama and 6 from Costa Rica. In general the raspador decorticated fibre was finer, showed greater resistance to abrasion (SS twist along the fibre) and greater flex life. The hagotan stripped fibre suffered fewer injuries and was coarser and stronger, showed greater resistance to abrasion (SZ twist across the fibre) and greater knot strength. The greater yields from the raspador machine method and economy of labour in harvesting were sufficient to justify the small reduction in quality. A method of measuring the cross-sectional area of bundles of fibres was developed. Abrasion and

flexure machines for long fibres were modified and data on their performance are presented. Various grading methods used in the Philippines and Central America are described and compared. [From authors' summary.]

2019. ANON.
Sisal.

Chem. Age, 1949, 60: 7, from abstr. in *Econ. Bot.*, 1950, 4: 83-4.

The economic importance of the by-products obtained during the extraction of sisal fibre has been established after 8 years' investigation, and may well exceed that of the fibre itself.

2020. GREENWAY, P. J.
Vegetable fibres and flosses in East Africa.
E. Afr. agric. J., 1950, 15: 146-53.

Some 250 indigenous and exotic plants in East Africa which are of commercial value or of some use to the natives as fibre or flosses are listed. Brief descriptions are given of the more important species and their uses.

2021. GOLDSCHMIDT, W. B.
The Stokroos [*Hibiscus* spp.]. Its chemical composition and probable fertilizer requirements in Lowveld soils.
Fmg S. Afr., 1950, 25: 29-30.

Fertilizer trials are briefly reported on local and Brazilian varieties of *H. cannabinus* [and/or *H. brasiliensis* ?], and chemical analyses of tops and roots are tabulated. On soils well supplied with K, application of superphosphate gave large yield increases. There were also indications that on acid soils Ca and Mg should be applied.—Subtropical Hort. Res. Stat., Nelspruit.

Guavas.

2022. WINSLOW, M. M.
Guavas at the citrus experiment station.
Yearb. Calif. Avocado Soc. for 1949, pp. 42-3.

Twenty-five guava varieties were planted at the Citrus Experiment Station, Riverside, California, in 1943. Low temperatures down to 25° F. in January 1949 caused severe damage, killing tops of most varieties back to the ground. Amongst varieties that proved relatively hardy Horne, Hart, May, Julie, and Esther yield well and produce fruit of good quality.

Mangoes.

2023. MUKHERJEE, S. K.
The varieties of mango (*Mangifera indica* L.) and their classification.
Reprinted from *Bull. bot. Soc. Bengal*, 1948, Vol. 2, No. 2, pp. 33, bibl. 19, illus. [received 1950].

Literature on the history and varieties of the mango and its dispersal throughout the tropics by the agency of man is discussed. Apart from seedling races which are found wild throughout the tropical forests of India to an altitude of 3,000 ft. and are mostly mono-embryonic, there are about 1,000 horticultural varieties in India perpetuated by vegetative propagation. Variation in the floral characters of these varieties is

very slight, and there is also striking stability in the number of chromosomes ($2n=40$), and similarity in pollen morphology. Classification therefore has to be based primarily upon the fruit, and the characters found useful in identification are listed. Seventy-two varieties of mango, mainly in Bengal and Bihar, are described with the aid of diagrams. They are classified in three groups, namely round-fruited, ovate-oblong, and long-fruited, and a key is provided to aid in their identification.

2024. MUKHERJEE, S. K.

Comparative morphology of the species of *Mangifera* Linn.

Reprinted from *Bull. bot. Soc. Bengal*, 1948, 2: 15-21, bibl. 2, illus. [received 1950].

The author divides the genus *Mangifera* into two sections: (1) those having a swollen disc above the petals comprising 34 species, and (2) those with the disc absent or reduced, comprising 7 species. The comparative morphology of these 41 species is here discussed briefly with respect to fruits, seeds, stems, leaves, inflorescences and flowers. The genus does not show a particularly wide range of variation, and shows affinity with the genera *Bouea* and *Anacardium*.—Dep. Bot. Calcutta University.

2025. MUKHERJEE, S. K.

The mango and its relatives.

Reprinted from *Science and Culture*, 1949, 15: 5-9, bibl. 14, illus.

The ground covered in the introductory sections of this paper is similar to that mentioned in abstract 2023 above. A table showing countries of origin and brief descriptions of the fruits are given for 15 species of *Mangifera*, 4 of which, apart from *M. indica*, are cultivated to some extent in the Far East, namely *M. foetida*, *M. odorata*, *M. caesia* and *M. caesia* var. *verticillata*. The author concludes with an outline of research that has been, and that still remains to be, undertaken on the mango.

2026. MUKHERJEE, S. K.

The taxonomic value of the anatomical structures of the inflorescence axes of *Mangifera* L.

Reprinted from *J. Indian bot. Soc.*, 1949, 28: 3: 162-71, bibl. 13, illus.

The study described here was based on 4 species in Section 1, *M. sylvatica* Roxb., *M. caloneura* Kz., *M. quadrifida* Jack and *M. similis* Bl., and 4 species in Section 2, *M. foetida* Lour., *M. odorata* Griff., *M. lagenifera* Griff. and *M. caesia* Jack. A comparative morphological analysis of the anatomy of the inflorescence axes, including the arrangement of resin ducts, does not reveal any marked distinctions. It is suggested that the genus is an assemblage of more or less homogeneous groups of species, showing slow, continuous, intergrading changes in their distinctive features.

2027. REECE, P. C., FURR, J. R., AND COOPER, W. C.

Further studies of floral induction in the Haden mango (*Mangifera indica* L.).

Amer. J. Bot., 1949, 36: 734-40, bibl. 6, illus.

Experiments were conducted on girdled, decapitated branches of the Haden variety of mango which were

defoliated at various intervals after removal of the terminal bud. Results indicate that the axillary buds, which normally remain dormant during the flowering period and some of which would later produce vegetative shoots, can be caused to differentiate inflorescences if they are given a suitable induction period. On the basis of the evidence presented, it is postulated that flower induction can take place only when cell division has started, and that there is a flower-inducing hormone which does not initiate growth, but when present in sufficient amounts at the beginning of growth determines the course of differentiation of the tissues in the axillary buds. When the inhibiting effect of the terminal bud was removed, and after growth had begun in the axillary buds, induction and differentiation of flowers rapidly followed if leaves were present on the stem. The flower-inducing hormone is intercepted by girdling, but it can move proximally in one branch and distally into an adjacent branch of a forked pair and act upon the most distal buds of the second branch. The inhibiting effect of the terminal bud is transmitted proximally and affects the buds below, but it was not observed to exert its effect upon the axillary buds of an adjacent member of a forked pair. The inhibiting effect of the terminal bud is also interrupted by a girdle. It is emphasized that induction and floral differentiation in the mango is frequently very late and may begin as late as March, and that the process begins shortly before the inflorescence is clearly discernible. [Authors' summary.] [For report of earlier work, see *H.A.*, 16: 2234.]—U.S. Subtropical Fruit Field Station, Orlando, Fla.

Oil palms.

2028. DE IRMAY, H.

La palmera "Cúsi" y el aceite de "babassú". Un gran recurso forestal de Bolivia, *Orbignya phalerata*, Martius. (The "Cúsi" palm, *Orbignya phalerata* and "babassú" oil. A potential industry from the forests of Bolivia.)

Rev. Agric. Cochabamba, 1949, 6: 5: 29-42, bibl. 12, illus.

The "Cúsi" palm, a relative of the babassú oil palm of Brazil (*Orbignya martiana*), grows wild in Bolivia over large areas of the Departments of Santa Cruz and Beni. The fruits are a rich source of babassú oil, which is used as a substitute for coconut oil in soap making, margarine and glycerine manufacture, etc. This valuable natural source of oil has not yet been tapped commercially, but the author considers that with proper management the "Cúsi" palm forests could be profitably exploited. He here reports on a survey made of a forest zone in the Department of Santa Cruz where, over an area of 100,000 ha., the "Cúsi" palm is the predominant species. Its performance and production were found to vary greatly with environment. In areas where the vegetation is mixed and competitive, the "Cúsi" palm does not come into bearing for 20 or 30 years, and in very dense pure stands of "Cúsi" production is low. In more open situations, however, where the stand does not exceed 100 trees per ha. and where there is little competition, the palms come into bearing in 8-12 years and bear prolifically and regularly. If the trees are

to be utilized commercially, they should be thinned to a stand of 120 per ha. and all competitive vegetation should be cleared. The resulting "cúsi pastures" might incidentally make suitable grazing land for cattle. Only 30,000 ha. of the area surveyed was considered suitable for exploitation, and at present these contain an average of 50 bearing trees per ha. This would produce an immediate yield of 300,000 kg. of oil yearly. By good forest management this might ultimately be increased tenfold.

2029. FERRAND, M., AND OLLAGNIER, M.
Premiers résultats d'une expérience d'aménagement et d'éclaircie de la palmeraie naturelle. (First results of a management and thinning-out experiment on wild oil palms.)

Oléagineux, 1950, 5: 296-300.

Three years' results are given of an experiment carried out at Grand-Drewin, Côte d'Ivoire, by the I.R.H.O., in which wild oil palms were subjected to cleaning and thinning treatments. Cutting down the undergrowth and cleaning the trees of dead leaves and epiphytes nearly trebled their yield per ha. by the third year. A further highly significant increase resulted from thinning the number of trees down to 160 per ha. compared with 200 to 224 trees in the controls.

2030. FERRAND, M., AND OLLAGNIER, M.
Premiers résultats des essais de fumure minérale sur le palmier à huile, à Dabou. (Preliminary results of fertilizer trials on oil palms at Dabou.)

Oléagineux, 1950, 5: 227-33, bibl. 2, illus.

The experiment described here was laid out at Dabou in the Ivory Coast in 1946 using 16-year-old palms growing on sandy-clay laterite soil. Yields were recorded in 1946-47, and 6 manurial treatments were applied in July, 1946, namely 5 treatments involving P, 3N and 3K and an unmanured control. Both in 1948 and 1949 very marked responses were obtained from K, supplied at the rate of 1 kg. potassium chloride per tree, yields in the first year being increased by 90% to 100% and in the second by 70%. The effect of N was slight and that of P nil. The increases due to K were similar both for numbers of bunches produced and for total weights of bunches. The foliage of the trees receiving K became dark green and much more luxuriant than that of the controls. This result confirms experience gained elsewhere in French West Africa on coastal laterite soils. Although the residual effect of K has been pronounced, the reduced response in the second year suggests that annual, or even more frequent, applications may give still better results.

2031. HARTLEY, C. W. S.
The effect of a potassium magnesium fertilizer on the yield of oil palms on hill quartzite soil.

Malay. agric. J., 1950, 33: 38-41, bibl. 2.

Whereas in previous trials there had been no response to K, the use of "patent kali", a proprietary fertilizer containing 29.61% K₂O and 9.82% MgO, in a trial started in 1939 produced a significant increase in the yield of bunches a year later. Sixteen months after the first application of "patent kali", leaves on most of the treated plots became appreciably greener. This

became more marked in 1941, although leaf yellowing and premature withering was still far from cured.

2032. JOVER, H.
Note technique sur la lutte contre *Coelaenomenodera* sp. parasite des palmiers à huile à La Mé. (Note on the control of *Coelaenomenodera* sp. attacking oil palms at La Mé.)

Oléagineux, 1950, 5: 156-60.

In 1948 oil palms at the Station expérimentale de La Mé were attacked by a beetle, *Coelaenomenodera* sp., both adults and larvae damaging the leaves, the latter by mining. The life history of the pest and the damage caused are described, and mention is made of two fungi found to be parasitic on it. In control experiments made in 1948 and 1949 spraying with 2% HCH gave better results than did DDT at two concentrations.

Pineapples.

(See also 2129.)

2033. GANDHI, S. R.
Pineapple culture in western India.
Poona agric. Coll. Mag., 1949, 40: 3: 33-9.

General instructions are given for the cultivation of pineapples on the coast of Bombay Province.

2034. PY, C.
Ananas, systématique, origine, dispersion, génétique. (The classification, origin, distribution and genetics of the pineapple.)
Fruits d'outre mer, 1949, 4: 407-14, and 1950, 5: 5-12, bibl. 40, illus.

A clearly illustrated review of the literature on the pineapple. Points covered include the classification of the genus *Ananas* and *Pseudananas* and its cultivated varieties, the distribution of species in South America and of cultivated pineapples in the main producing countries, its cytology, methods of multiplication, mutations, and the genetical basis for raising improved types.

2035. JACQUES-FÉLIX, H.
Discussion sur la fasciation de l'ananas. (A discussion on fasciation in pineapples.)
Fruits d'outre mer, 1950, 5: 39-50, bibl. 13, illus.

Fasciation in pineapples was described by C. Py, *Ibidem*, 1949, 4: 180; *H.A.*, 19: 3450, and his findings and those of other workers are further considered in this article. The various types of abnormality found are described with the aid of clear photographs and diagrams. The term "fasciation" covers two distinct phenomena, which may occur in a single plant side by side or superimposed on one another, namely the fusing of neighbouring axes and the abnormal enlargement of the axes. The growth behaviour associated with these phenomena is described. Abnormal enlargements producing fan-shaped or multicrowned pineapples cannot be ascribed solely to luxuriant growth arising from external factors such as excess of nitrogen, or to injuries, because even where such conditions do not obtain they can arise as a result of lack of apical development of the supra-floral axis. A predisposition towards degeneracy of the apical growth is an inherited character found in several varieties. Careful study will

be needed to determine the respective parts played in producing fasciated pineapples by injuries, by external agents, and by inherited characters.

2036. CARTER, W.

Insect notes from South America with special reference to *Pseudococcus brevipes* and mealybug wilt [of pineapple].

J. econ. Ent., 1949, 42: 761-66, bibl. 7.

Observations made in Brazil, Dutch Guiana, Trinidad and the Canal Zone.

Rubbers and other laticiferous plants.

2037. ZILLER, R.

Représentation schématique des travaux de sélection en heveaculture. (Diagrammatic representation of rubber selection work.)

Cah. Inst. Rech. Caoutch., Indoch., 1949, 4: 15-17, illus.

A system of models of fields is described in which each tree is represented by a bamboo peg, variously coloured to denote yield, general characteristics, etc., with selected mother-trees labelled.

2038. BERWICK, E. J. H.

The removal of standing rubber on coastal Malays.

Malay. agric. J., 1949, 32: 298-303, bibl. 3, illus.

The common method of destroying rubber trees by poisoning with sodium arsenite is cheap and effective, but it has three disadvantages: It does not eliminate existing sources of root disease; secondly, if root disease appears in a replanting, the cost of control is much increased by the presence of rubber stumps forming a bulky source of infection; and thirdly, poisoning prevents the use of tractors for some years. This article describes felling by two methods: By means of a stump puller on a Caterpillar D.8 tractor, and secondly by means of a wire cable between two heavy tractors. If the succeeding crop is one susceptible to root diseases, it is desirable to fell the trees with a tree-dozer to ensure removal of major roots. Various difficulties encountered are described, and it is emphasized that on such heavy soils the work can only be properly done in dry weather and provided drains are kept open.

2039. BORGET, M.

Toxicité de cinq nouveaux fongicides pour quelques espèces de champignons hévéicoles: essais au laboratoire. (Laboratory studies on the toxicity of five new fungicides to fungus species attacking hevea.)
Cah. Inst. Rech. Caoutch., Indoch., 1949, 4: 1-13, bibl. 15.

Laboratory toxicity investigations are described for five fungicides, Nos. 31, 83, 99, 133 and 154, manufactured by Rhône-Poulenc, compared with copper sulphate and paranitrophenol, against seven fungi that attack hevea: *Corticium salmonicolor*, *Phytophthora palmivora*, *Gloeosporium alborubrum*, *Botryodiplodia theobromae*, *Pestalotia palmorum*, *Curvularia maculans* and *Fusarium decemcellulare*. The effects of the fungicides on both growth and spore germination were studied. The conclusion is reached that the following are worthy of field trials: No. 154, particularly against *Phytophthora*, No. 133, against *Corticium*, and No. 31.

2040. ANON.

Les caoutchoucs spécifiés. (Specified rubbers.) [Full English translation pp. 633-5.]

Rev. gén. Caoutch., 1949, 26: 597-600, illus.

Rubber growers in Indo-China have agreed to mark their crude rubber according to six grades, three based on Mooney viscosity, over 87° marked (X), 87°-73° (0) and below 73° (—), and three based on rate of vulcanization, the crosses, circles, etc., being coloured red for slow, yellow for medium and blue for fast. This system will make it easier for buyers to obtain the grades of rubber they want for particular purposes and will also provide producers with a guide to market requirements.

2041. BONDAR, G.

Árvores lactíferas na Bahia e nova indústria extrativa de gomas. (Laticiferous trees in Bahia and a new industry of gum extraction.)

Tipografia Beneditina, Bahia, 1948, pp. 44, bibl. 15, illus. [received 1950].

The first species to be exploited for the production of chicle gum was *Achras sapota* (sapodilla), a tree that grows extensively in tropical America. During the last war the commercial potentialities of many other latex-producing trees of Brazil were investigated, and several species proved promising, among them *Couma rigida*, *Macoubea guianensis*, *Laemellea pauciflora* and *Tabernaemontana* spp. The possibility of exploiting these species, and thus developing the gum extraction industry in the State of Bahia, Brazil, is considered. The botanical characters, distribution and horticultural value of each of the species is discussed, and information is given on methods of extraction of the latex, preparation of the gum and cultivation of the trees.

2042. BONDAR, G.

Janaúbas na produção de goma de chicle. (Species of *Himatanthus* and *Plumeria* for the production of chicle gum.)

Tipografia Beneditina, Bahia, 1948, pp. 23, bibl. 10, illus. [received 1950].

These two latex-producing genera, natives of South and Central America, have not hitherto been exploited commercially owing to the difficulty of coagulating the latex. In the last 2 years this difficulty has been overcome, and the coagulated latex has proved very valuable for the production of chicle gum [the basic ingredient of chewing gum]. The taxonomy of the genera is discussed. *Himatanthus* is native to the State of Bahia, Brazil, and covers large areas of poor soil unsuitable for other agricultural purposes; it grows readily from seed. The characters and gum-producing capacity of the various species found in Bahia are described. *Plumeria* is grown as an ornamental tree in Bahia, but could be planted commercially, as it grows rapidly and is easily propagated by cuttings. Directions are given for the extraction of the latex and preparation of the gum.

Sugarcane.

(See also 1588-1590.)

2043. F.A.O.

Sugar.

Commodity Rep. F.A.O., Washington, D.C., 1950, pp. 31, 25 cents.

A summary, with much tabulated information, of the world situation as regards production and consumption.

2044. AHMAD, S. I.

Sugar in India and Pakistan: a review.

Agric. Pakistan, 1949, 1: 23-5.

A brief account giving figures of acreages, yields and methods of utilization.

2045. STEVENSON, G. C.

Report on a visit to the Dominican Republic, August 1949.

Bull. B.W.I. centr. Sugar Cane Breed. Stat., Barbados, 30, 1949, pp. 12.

The cultivation of sugar cane as practised in the Dominican Republic is outlined. Annual production of sugar is about 500,000 short tons from some 300,000 acres. P.O.J.2878 predominates among the many cane varieties, some very old, grown. Among newer varieties receiving attention are M.336, B.34104, B.37161 and Co.421. It is recommended that these and newer B seedlings should be subjected to properly laid out trials to determine yield behaviour, juice quality and tolerance to mosaic under local conditions. The increased use of fertilizers is strongly urged, and it is suggested that spacing trials should be made to see if the B varieties might not be planted closer than is the general practice.

2046. KING, N. J.

Varietal trials—1949 season.

Cane Gr. quart. Bull., 1950, 13: 123-31.

Combined plant and first ratoon crop yields on seven farms showed Trojan to be superior to Eros and Q.54. In plant trials on three farms Pindar and Trojan gave highest yields of sugar per acre and were more vigorous than H.Q.426, N.G.15 (Badila) and B.212. Results of six other plant trials and one first ratoon trial are reported. In five of them Q.50 gave highest yields of both cane and sugar, leading Pindar in two trials and Trojan in a third.

2047. HUGHES, C. G.

The production and testing of sugar-cane seedlings.

Tech. Commun. Bur. Sugar Exp. Stat. Dep. Agric. Qd 2, 1949, pp. 17-69, bibl. 14, illus. and *Qd. J. agric. Sci* 1950, 6: 1-53.

A detailed account is given of the progress made and technique developed for producing and testing sugar cane seedlings in Queensland, with particular reference to the last 10 years.

2048. RAMOS, F. V., AND CALMA, V. C.

The production and selection of (P.B.929 × P.O.J.2878) F₁ seedling canes.

Philipp. Agric., 1949, 32: 297-304, bibl. 5.

Six out of 36 seedlings of the cross P.B.929 × P.O.J.2878 have been selected for multiplication and field trial.

2049. LAL, K. N., AND MEHROTRA, O. N.

Studies in crop physiology: cell-size characteristics of sugar-cane varieties in relation to drought resistance.

Bot. Gaz., 1949, 111: 193-210, bibl. 63.

The characteristics of the epidermal and stomatal cells of leaves of 12 varieties of sugar cane were studied in relation to factors such as leaf surface, leaf age and tiller age. On the basis of this study, the varieties were

classified into 3 groups, the members of each of which show distinct similarities in cell characters: (1) *varieties with low cell indices*: Co. 205, 385, 453 and Rheora; (2) *varieties with medium cell indices*: Co. 290, 299, 356 and 313; and (3) *varieties with high cell indices*: Co. 213, 312, 421 and Co. S 76. The lower the indices, the greater appears to be the drought resistant capacity of the variety. Cell size, however, is affected by various other factors, the most important of these being chromosome number, leaf surface, leaf age and maturity of tiller. The effect of each of these factors is discussed at length. It is shown how such a study could be of use in the classification of sugar cane varieties according to drought resistance.—Benares Hindu University, India.

2050. STEVENS, F. D.

A further statement as to flooded cane in the Florida Everglades.

Sugar J., 1949, 12: 1: 7, 15.

Where cane of two varieties was flooded for over 2 months from September to November to a depth of 4 feet, but with the growing points above water at all times, there was rapid recovery of recoverable sugar during December following removal of the water at the end of November. Acidity of juice also soon became normal. Ratoon growth of the flooded fields was comparable with that of cane on similar land that was not flooded but was very wet during the same period [see also *H.A.*, 19: 584].

2051. KHANNA, K. L., AND CHACRAVARTI, A. S.

The effect of water-logging on the chemistry of sugarcane juice.

Curr. Sci., 1949, 18: 443-4, bibl. 7.

Comparing cane of 2 varieties that had been water-logged from July to September with normal cane showed the former to have reduced polarization but greatly increased invert sugars, total colloids, gums, pectin, non-protein nitrogen and ash, the rise in invert sugars and gums being particularly pronounced. The poor technological properties of water-logged cane juices and losses in sugar recovery are attributed to the fact that nearly 90% of the total nitrogen occurs as non-protein or "harmful" nitrogen.

2052. AYRES, A. S.

Release of non-exchangeable potassium in Hawaiian sugar cane soils.

Tech. Bull. Hawaii agric. Exp. Stat. 9, 1949, pp. 50, bibl. 61, illus.

Sugar cane itself was not used in this soil study. Apart from chemical investigations, levels of potassium in plants and the effects of cropping were determined for 12 soils with Sudan and *Panicum* grasses grown in Mitscherlich pots.

2053. KHANNA, K. L., PRASAD, S. N., AND BHATTACHARYA, P. B.

Improvements in colorimetric determinations. Part II. A rapid method for estimation of organic carbon in soils.

Proc. Indian Acad. Sci., Sect. B, 1949, 30: 11-16, bibl. 6.

Techniques for laboratory and field estimations evolved at the Central Sugarcane Research Station, Pusa, Bihar, are described with the aid of colour standards.

2054. BONNET, J. A., CAPÓ, B. G., AND RIERA, A.
Lack of response of sugarcane to applications of phosphorus in Puerto Rico.
J. Agric. Puerto Rico, 1946, 30: 186-95, bibl. 5 [received 1950].

In trials over several years with different varieties growing on 14 soil types on the coastal plains, the use of P in fertilizer mixtures had no effect, beneficial or detrimental, on yields of cane. The annual expenditure on P_2O_5 in compound fertilizers for sugar cane in Puerto Rico is about \$800,000.

2055. BORDEN, R. J.
Recent developments in sources of nitrogen for fertilizing crops.
Hawaii. Plant. Rec., 1949, 53: 79-88, bibl. in text.

The various forms of nitrogenous fertilizer now on the market are described briefly. In tests on Hawaiian sugar cane soils [not described] there have rarely been any significant differences in yield responses to different N fertilizers, but differences in juice analyses indicate effects that can be attributed to secondary elements in nitrogenous fertilizers.

2056. ELLIOTT, J. T.
The Casewell compaction roller.
Cane Gr. quart. Bull., 1950, 13: 112-14, illus.

A newly designed, spring mounted roller forming a permanent attachment to the cutter planter is described with the aid of photographs. The roller runs in the planted furrow between the planting boards and the rakes, and compacts the soil around the setts. It has performed well in Queensland in both light and heavy soils and on uneven surfaces.

2057. KNUST, H. G.
Mechanical harvesting of cane in the Bundaberg district.
Cane Gr. quart. Bull., 1950, 13: 115-22, bibl. 1, illus.

Some features of the following machines are described with the aid of photographs: The Fairymead two-row cane harvester, the Toft cane harvester, two Norgrove shear-blade cutters, and the Bonel cutter.

2058. ANON.
Machine harvesting in Louisiana.
Sugar J., 1949, 11: 12: 13-16, illus.

Harvesting of cane in Louisiana is fully mechanized, no cane being touched by hand at any stage. This has been made possible by the advent of high speed, high clearance wheel tractors with large pneumatic tyres and a wheel base of 6 feet corresponding to the spacing between rows. Various types of harvester, loader and tractor used are illustrated.

2059. ANON.
New Hurry-cane loader.
Sugar J., 1949, 12: 1: 21, illus.

A note on the new Thompson Hurry-cane loader which has been changed from automatic mechanical to hydraulic operation.

2060. HES, J. W.
Gallen bij het suikerriet op Java. (Galls on sugar cane in Java.)
Chron. Nat., 1950, 106: 65-8, bibl. 14, illus.

A review of the literature concerning these galls, which occasionally appear on the stems of sugar cane and sometimes produce buds and roots. Their cause is unknown but they have been induced experimentally by injection of insect extracts or growth-promoting substances.

2061. BLACKBURN, F. H. B.
Some recent developments in froghopper control.
Trop. Agriculture Trin., 1949, 26: 93-102, bibl. 15.

Several experiments are described, particularly with DDT and BHC and including trials with a fog applicator and a helicopter, the results of which suggest that the froghopper can best be controlled by destruction of either the nymph or the egg. Application to the cane stools of 1 cwt. 5% BHC per acre by hand duster within 5 weeks of the first appearance of spittle (nymphs) should give satisfactory control for a cost of about \$7.00 [28s.] per acre. Preliminary trials with DNOC as an ovicide have given promising results, and further trials are to be made.

2062. POTTER, T. E. K., AND CARRINGTON, A. J.
A further investigation in the control of the Trinidad froghopper (*Tomaspis saccharina* Dist.) by application to the nymphs of a 4% benzene hexachloride dust.
Trop. Agriculture Trin., 1949, 26: 113-17, bibl. 5.

In a trial in 1948 first brood froghopper nymphs were completely and economically controlled by the application of an Agrocide dust formulation containing 4% BHC at rates of 1 cwt. per acre and upwards. Control was maintained throughout the period of the experiment, 111 days.

2063. WILLIAMS, J. R.
A discussion on the present status of the sugar-cane pest *Clemora* (*Phytalus*) *smithi* in Mauritius.
Rev. agric. Maurice, 1949, 28: 292-5, bibl. 3.

The history of the pest, introduced from Barbados in 1911, is outlined. In 1934 it caused an annual loss of yield estimated at 20%. Since then the severity of attack has declined as a result of a combination of the following factors: Tractor ploughing, planting in July-September in place of January-February, the introduction of Scoliid parasites of which 7 species are now common in Mauritius, and the planting of resistant varieties, notably M.134/32. Further studies are needed on new resistant cane varieties, the introduction of further parasite species and the encouragement of existing species by planting flowering shrubs on which they feed, notably *Eupatorium pallescens*, and on the newer insecticides used against soil insects.

2064. JULIEN, J. H.
Notes on the propagation of *Eupatorium pallescens*.
Rev. agric. Maurice, 1949, 28: 296-7.

E. pallescens is a drought resistant evergreen, which, flowering throughout the year, provides nectar for Scoliid parasites of the sugar cane pest *Clemora smithi*. In propagation experiments at the Sugar Cane Research Station 80-90% success was achieved, even in dry conditions, by dipping the cuttings completely

in molten paraffin wax of low melting point following immersion of the lower end in a 1% solution of aretan to prevent rotting. Only 10% of untreated cuttings struck. There was no additional response to the use of hormones. Propagation from seed was also satisfactory provided the fruit clusters were picked when reddening, dried for a few days, and the seed then extracted and sown at once.

2065. DOTY, R. E., AND WISMER, C. A.
Controlling molding of rolled oats rat bait with chemicals.
Hawaii. Plant. Rec., 1949, **53**: 65-73, bibl. 10.

The prebait method of rat control is standard practice on sugar cane plantations in Hawaii. Laboratory and field tests with several fungicides showed 0.5% para-nitrophenol to be an excellent mould deterrent for rolled oats used for bait, and it did not affect consumption of unpoisoned or poisoned grain by rats.

Tea.

2066. KEHL, F. H.
Shaping the future [tea] bush. A note on the preliminary treatment of young clonal plants.
Tea Quart., 1949, **20**: 93-6, illus.

Considerable mortality resulted when tea plants raised from cuttings were centered [headed back] at 2-4 in. above ground level when these were 2-3 years old, as is commonly done with seedlings. In a trial in 1942 mortality was much reduced by centering at 5-8 in. from the ground when the plants were 10 months old. It is suggested, however, that growth rather than age should be the guide and that centering can best be done in the nursery when the plant is 10 in. high and carrying 8 to 10 leaves. The top should be cut off leaving 3-4 leaves, and, should this fail to induce branching, the new growth should be nipped 1-2 in. above the previous cut. First pruning, cutting back to 12 in. from ground level, is generally possible about 1 year after centering; overgrown leaders being cut back to 4 in. above the centering cut. There is some evidence that early centering increases yields in early years.

2067. TUBBS, F. R.
Plucking standards.
Tea Quart., 1949, **20**: 85-93.

The effects of cultural treatments and bush type on the production of leaf of a satisfactory and even standard are summarized. The results of long-continued examination of plucking standards as achieved in practice are described. Data are tabulated for the percentages of unbroken flush and banji [dormant] shoots and the percentages of all shoots by weight for samples from St. Coombs, Ceylon, and Galatura, Travancore. Damage has been found to rise as high as 57% by weight in commercial plucking. The effects of variations in standards of plucking from one estate to another may clearly exceed the average effects of the other factors examined. Suggestions are made for sampling as a guide to the maintenance of a high plucking standard. The aim should be to maintain an average of at least 80% by number of two leaf shoots, or, by weight, 75% of two leaf shoots and under

5% of broken material. The relative proportions of bud, first and second leaves and of the two included internodes in a normal flush and in a two leaf banji at St. Coombs are tabulated for the 3-year period following clean pruning, and the trends shown are discussed.

2068. HARLER, C. R.
The mechanical plucking of tea: re-assessment of an old problem.
Nyasaland agric. Quart. J., 1949, **8**: 40-7, reprinted from *Tea and Rubber Mail*, 3 March, 1949.

Systems of plucking, both hand and mechanical, used in Assam and Japan are discussed. The light hand shears used in Japan can increase the rate of plucking ten-fold and equipment of this sort should be given a trial in India in preference to heavy or complex machinery. Mechanical plucking may result in a larger crop, but reduction of quality due to lack of discrimination and the removal of as many as 4 leaves and a bud. Investigation is needed to determine the effect on the tea bush.

2069. GADD, C. H., AND LOOS, C. A.
The fungus, *Exobasidium vexans*.
Tea Quart., 1949, **20**: 54-61, bibl. 7, illus.

This article is primarily an account of the fungus *E. vexans*, which causes blister blight leaf disease of tea, and its mode of transmission, but the results of the studies described form the basis of suggestions for minimizing the damage caused. The spores cannot survive high temperatures; thus the disease is unlikely to prove serious at lower elevations; shade should not be eliminated but could be controlled to admit sunlight at times when it would be beneficial. Infection occurs most readily on young leaves enveloping buds, older leaves and stems being relatively much more resistant; thus pruning should be timed to obtain dry weather recovery when spore production is at a minimum. Finally there is much variation in the susceptibility of individual bushes, and the best of the resistant bushes should be propagated vegetatively.

2070. PORTSMOUTH, G. B., AND LOOS, C. A.
Blister blight—A review.
Tea Quart., 1949, **20**: 77-84, bibl. 12.

In addition to control by adjustment of pruning dates, regulation of shade and the establishment of resistant clones [referred to in abstract 2069 above], the use of sprays and modifications of plucking policy are here discussed. Copper fungicides have so far proved the most effective, but owing to the frequent applications needed they cannot be recommended for use on tea in plucking because of the progressive accumulation of copper in the manufactured product. Their use should therefore be limited to tea recovering from pruning and to nurseries. Among spray equipment so far tested results with a fog applicator have not been promising. As regards plucking it is suggested that where leaves only are being attacked normal plucking should be done at more frequent intervals, but that where both stems and leaves are attacked it is recommended to pluck to the fish leaf for the duration of the attack. When the attack has died down bushes so plucked should be rested for a few rounds to restore their total leaf surface.

2071. (TEA RESEARCH INSTITUTE OF CEYLON.)

Proceedings of the first symposium on blister blight control.*Tea Quart.*, 1949, 20: 97-159.

Combined Nos. 3 and 4 of this journal are devoted to the proceedings of a conference held at Nuwara Eliya in November 1949. The following technical reports are included: *Ceylon*: 1. The general position (J. Lamb); 2. The work in progress (C. A. Loos); 3. Agricultural aspects (G. B. Portsmouth). *South India*: 1. Present position and control (S. A. Rau); 2. The position in the High Range (W. W. Mayne). *North India*: The position in N.E. India (E. Hainsworth). *Sumatra*: The position in Sumatra (J. H. van Emden and J. Reitsma). *General*: 1. Agency house views on the blister blight situation (G. K. Newton); 2. Planting views on the blister blight situation (K. Morfold); 3. Impressions of the blister blight control problem (F. W. J. Lane and R. M. Greenslade). The journal concludes with "a report on blister blight disease in Ceylon tea plantations" by Mr. J. Lamb, the Acting Director, Tea Research Institute of Ceylon, to the Tea Controller, in which he covers the following points: (1) History of the disease; (2) A review of its effect on the tea industry; (3) The work of the Tea Research Institute; (4) Recommendations for future research work on methods for controlling blister blight.

Vanilla.

2072. BOURIQUET, G., AND HIBON, E.

Quelques vanilliers cultivés dans les établissements français d'Océanie. (Some types of vanilla cultivated in the French Pacific colonies.)

Agron. trop., 1950, 5: 54-61, bibl. 14, illus.

Descriptions are given with photographs of the following forms of vanilla, which in addition to the Mexican type, *V. planifolia*, are found in the French Pacific islands: Tahiti, Tiarei, Haapape (Papenoo, Mahina or Teriirao) and Potiti. Some do not readily shed their seeds and it is hoped to make use of this character in future breeding work [see also *H.A.*, 10: 1129].

2073. CERNUDA, C. F.

A simple mathematical procedure for use in curing vanilla to a desired moisture content.

Trop. Agriculture Trin., 1949, 26: 124-5.

A table of factors is given which provides a simple method of determining how much to dry fresh vanilla beans to obtain the desired moisture content.

Other crops.

(See also 1596, 1599, 1603, 1629, 1716, 1717, 1879f, g.)

2074. CORNER, E. J. H.

The annonaceous seed and its four integuments.

New Phytol., 1949, 48: 332-64, illus.

The microscopic structure of the seed is described for 16 annonaceous plants. *Annona* and *Canarium* have a rudimentary aril. *Canarium*, *Mezzettia* and *Xylopia curtisii* have a middle integument developed as a post-fertilization feature on the sides of the ovule between

the outer and inner integuments, and functioning as the testa. Thus, there can be four integuments: the outer (first), the inner (second), the aril (third) and the middle (fourth) integuments. Eleven peculiarities of the annonaceous seed are listed.

2075. GOPALAN, K.

The arecanut industry in India.

Indian Cocon. J., 1949, 3: 66-74.

Although the acreage under areca nuts in India is estimated to exceed 250,000, this supplies little more than half the country's needs. The Indian Central Arecanut Committee was set up in September, 1949, with the object of increasing home production and encouraging research work. Among problems requiring attention are the Mahali disease, a root disease found in Mysore, the provision of better planting material, and improved methods of curing and drying.

2076. RAMAKRISHNAN, K., AND RAMAKRISHNAN, T. S.

Banded leaf blight of arrowroot, *Maranta arundinacea*.

Indian Phytopath., 1948 [? 1949], pp. 129-36, from abstr. in *Rev. appl. Mycol.*, 1950, 29: 194.

This disease, caused by *Corticium solani*, showing as a chlorotic banding of the leaves with ultimate browning and rotting, spreads rapidly in close association with heavy rain. Satisfactory control was obtained in four gardens by preventive spraying with 1% bordeaux mixture in July. Spraying should be carried out every year before the monsoon, using special care to obtain complete coverage of both leaf surfaces.

2077. HAGEMAN, R. H., DELGADO, R. F., AND CHILDERS, N. F.

The use of dynamite in lifting bamboo clumps for propagation.

Trop. Agriculture Trin., 1949, 26: 122-3, bibl. 3, illus.

The demand for bamboo for soil conservation and various industrial purposes has led in Puerto Rico to the method, described here with the aid of photographs, of lifting clumps for propagation with dynamite. Compared with hand digging the cost of lifting larger clumps was halved and the divisions sprouted equally well.

2078. CHAKRAVARTY, H. L.

Morphology of the staminate flower of bottle gourd, *Lagenaria leucantha* (Duch.) Rusby.

New Phytol., 1949, 48: 448-52, bibl. 16, illus.

The author, from the anatomical study described, considers that cucurbitaceous flowers are pentamerous with a tendency to reduction to trimery.—Botany School, Cambridge Univ.

2079. S., R.

Cardamom research.

Indian Fmg., 1949, 10: 501-2.

Investigations on cardamoms in Madras include the following: Thrips control by nicotine sulphate and gammexane, control of "clump rot" caused by *Pythium vexans* by application of phosphate, nursery practices including mercuric seed treatment to improve

germination, selection and breeding based on yields and oil contents. Eight selections are listed, which over 3 seasons gave yields of 32% to 139% above those of control plants.

2080. SEIFRIZ, W.

Gregarious flowering of *Chusquea*.

Nature, 1950, **165**: 635-6, bibl. 5.

Records show that—as with other bamboo grasses in India—the life cycle of *Chusquea abietifolia* in Jamaica is 32 years, the last flowering and subsequent death of the plants having occurred in 1949. The nature of gregarious flowering is briefly discussed.

2081. MANALO, G. D., AND WEST, A. P.

Analysis and composition of *Manila elemi*.

Philipp. J. Sci., 1949, **78**: 111-20.

Manila elemi is a resin contained in the bark of the pili tree, *Canarium luzonicum* (Blume) A. Gray and is used in pharmacy. The resin was found to consist mainly of resenes together with some resin acids and volatile terpenes.

2082. BOURLET, G.

Le problème du karité. (Problèmes associés with *Butyrospermum parkii*.)

Oléagineux, 1950, **5**: 364-7.

In a general résumé of problems associated with the development of the tree the author discusses production, consumption and the manufacture of shea butter for export, and points out that the crop is of vital importance to parts of French West Africa both as a source of fat and for checking erosion. Research on the growing of the trees is being undertaken by the I.R.H.O. at Niangoloko.

2083. PANSARD, J. (né PRADAIN, J.).

Contribution à l'étude du beurre de karité.

(A contribution to the study of shea butter [*Butyrospermum parkii*].)

Oléagineux, 1950, **5**: 234-40, bibl. in text, illus.

The seeds of three varieties of *B. parkii* were examined and the arrangement of the latex-bearing cells is described with the aid of diagrams. The unsaponifiable materials found in shea butter are due to the presence of this latex, and form the basis of the detailed chemical study described here. The literature on the subject is discussed, but, except in one case, full references are not given.

2084. MULLISON, E. G., AND MULLISON, W. R.

Vegetable varieties for the tropics.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 452-8, bibl. 4.

As a result of 2½ years' experience at Curaçao, Dutch West Indies, with vegetables grown in gravel culture with nutrients supplied by sub-irrigation, the varieties found most suitable are listed for tomatoes, cucumbers, eggplants, peppers, swiss chard and other greens,

lettuce, lima beans, green beans, celery, cauliflower, beetroots, radishes and leeks.

Noted.

2085.

a CHANDRASEKHARAN, S. N., AND SUNDARARAJ, D. D.

Double ovary in *Cocos nucifera* Linn.

Curr. Sci., 1950, **19**: 93-4, bibl. 3, illus.

b CLARK, L. H.

The export of pineapples.

Fmg S. Afr., 1950, **25**: 96, 102.

Hints on picking and packing.

c COPELAND, E. B.

***Pteridaceae* of New Guinea.**

Philipp. J. Sci., 1949, **78**: 5-41, illus.

d FURTADO, C. X.

Palmae Malesicae—X. The Malayan species of *Salacca* [Zalacca].

Gdns Bull. Singapore, 1949, **12**: 378-403.

e GADD, C. H.

Studies of shot-hole borer of tea. IV. Life cycle of the beetle. V. Borer population.

Tea Quart., 1949, **20**: 61-5, bibl. 5, illus., and 66-76, bibl. 3.

f GARCIA MENDEZ, M. A.

The part sugar plays in the Puerto Rican economy.

Sugar J., 1949, **12**: 3: 15, 21.

g KHANNA, K. L., AND BANDYOPADHYAY, K. S.

On sampling studies in the estimation of white fly incidence on sugarcane.

Curr. Sci., 1950, **19**: 58-9, bibl. 1.

h LÉONARD, J.

Étude botanique des copaliers du Congo belge. (Botanical study of the resin-(copal) bearing trees of the Belgian Congo.)

Publ. I.N.E.A.C., Sér. sci., **45**, 1950, pp. 158, bibl. 103, illus.

i RAO, R. R., AND NATARAJAN, S.

On "morellin" the antibacterial principle of the seeds of *Garcinia morella* Desrous.

Curr. Sci., 1950, **19**: 59-60, bibl. 2.

j ROY, A. C.

A mango chimaera.

Curr. Sci., 1950, **19**: 93, bibl. 7, illus.

k SENARATNA, J. E.

The correct botanical names of certain economic plants cultivated in Ceylon.

Trop. Agriculturist, 1948, **104**: 205-9, bibl. 3 [received Dec. 1949].

STORAGE AND PLANT PRODUCTS.

Storage.

(See also 1365-1368, 1371, 1391, 1392.)

2086. COMPIN, A.

Les stations d'emballage des fruits. Leur rôle, leurs possibilités et leur avenir. (Fruit packing houses; their influence, possibilities and future.)

Arbres et Fruits, 1949, No. 43, pp. 9-24, illus.

The economic effects and practical advantages arising from the development of centralized packing houses are discussed, and further extension to meet competition in foreign markets is urged.

2087. FRANKLIN, E. W.

Automatic fruit storage.

Canad. Gr., 1949, 72: 10: 8-9, illus.

A system of fruit storage, devised and operated by the Ontario Agricultural College is described. Temperature control in insulated buildings is obtained by thermostatically controlled fans and vents for introducing the cold early morning air. It is stated that 6° F. lower than the daily mean temperature can thus be maintained. For winter conditions electric space heating is employed. Constructional details are given to facilitate building by skilled labour.

2088. CAREY, L. C.

Containers in common use for fresh fruit and vegetables.

Fmrs' Bull. U.S. Dep. Agric. 2013, 1950, pp. 61, illus., 20 cents.

Without attempting to recommend one type of container rather than another, this bulletin describes with numerous illustrations the containers most commonly used in the main producing areas in the U.S.A. for fruits and vegetables of all types, both temperate and sub-tropical.

2089. ULRICH, R.

L'emploi du froid dans le transport et la conservation des prunes et pruneaux. (The use of refrigeration in the transport and storage of plums and prunes.)

Rapports présentés au 2e Congrès national de la prune et du pruneau, Agen, 1948, in Bordeaux et le Sud-Ouest, 1949, 30: 1: 122-4, bibl. 15.

A review of the literature on the cold storage of plums and prunes, with special reference to the effect of time of picking, conditions of storage or transport, and post-storage treatment on results.

2090. EGGENBERGER, W.

Biochemische Untersuchungen an Äpfeln während der Entwicklung und Lagerung. (Biochemical studies on apples on the tree and in storage.)

Ber. schweiz. bot. Ges., 1949, 59: 91-154, bibl. 123.

The investigation was carried out on apples from two trees of different varieties (Belle de Boskoop and Waldhöfer) during the growing season of 1946 and subsequent storage. The following are some of the results obtained: (1) The weight of the fruit increased

almost up to harvest time in October, while it decreased slowly and continually in storage. (2) During growth the dry matter content increased from 13% to 17% of the fresh weight; in storage both dry matter and water content decreased, the water loss being 2-7 times greater than the loss of dry matter. (3) The content of mineral substances increased up to harvest time—though not in percentage of fresh weight—and did not change thereafter. In Boskoop the mineral content of the mature fruit was 0.27% of the fresh weight, phosphoric acid making up 8-11% of the total. (4) Acid content increased until shortly before harvest and decreased during storage. (5) Total sugar content increased up to harvest, absolutely and in relation to the fresh weight, the relative increase in saccharose being greater than that of reducing sugars. (6) Total N, in percentage of fresh weight, decreased up to harvest time. (7) Starch synthesis began before the June drop and continued until the middle of August when the highest starch content was reached (Boskoop 29%) and rapid decomposition set in, which, however, was not complete at harvest time. (8) Cellulose formation continued until harvest, cellulose content varying from 0.7% to 1.3% of the fresh weight. (9) Pectic acid content varied from 0.7% to 1.1% of the fresh weight; pectins of highest quality were extracted from the residue of mature apples. The literature on pectins is reviewed and analytical data are presented in great detail, as the investigation was chiefly concerned with this substance. (10) The results show that maturity in apples cannot be chemically defined.—Eidg. Tech. Hochschule, Zürich.

2091. AUSSET, C.

(1) Le conditionnement des agrumes en Afrique du Nord. (Citrus packing house practices in North Africa.)

(2) Fabrication de jus d'agrumes en Afrique du Nord. (The manufacture of citrus juice in North Africa.)

Fruits d'outre mer, 1949, 4: 371-6 and 400-6, illus.

The author visited North Africa to study methods of disposing of the citrus crop, mainly oranges and mandarins, and he here outlines mechanical methods used in packing houses. The operations he describes with the aid of diagrams are washing, brushing, and drying with warm air, elimination of undersized fruits, grading, borax treatment, waxing, sizing and packing. Types of machines and the order in which the processes take place vary somewhat. In the second article he describes the methods used for extracting and processing citrus juices.

2092. MARTIN, D., AND ROBERTSON, R. N.

Plant growth substances related to problems of fruit and vegetable storage.

Food Pres. Quart., 1949, 9: 37-40, bibl. 8.

At least one growth substance is of direct practical application to fruit and vegetable storage problems, i.e. methyl α -naphthaleneacetic acid in the anti-sprouting treatment of potatoes. Other direct uses of growth substances have introduced interesting possibilities in the experimental stage, but have not yet reached the stage for definite recommendations.

2093. STEWART, W. S.

Effects of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid on citrus fruit storage.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 109-117, bibl. 10, illus., being *Pap. Calif. Citrus Exp. Stat.* 602.

Increased storage life in Eureka lemons in southern California resulted from spraying the trees before harvest with 2,4-D or 2,4,5-T, particularly the latter, or from dipping the fruit after harvest in 2,4-D solutions or exposing them to 2,4-D vapour or coating them with 2,4-D in wax. This was due to a decrease in black-button (blackened calyx) formation and attendant *Alternaria* rot. Grapefruit and Washington Navel oranges from trees sprayed with 2,4-D also developed fewer black buttons in storage. With Valencia oranges, showing very little decay in any case, there was no obvious effect on storage rots, though granulation appears to have been reduced by spraying, and fruit drop was reduced by 32·3%.

2094. HINTZE, S.

Lagring av vitkål i betongkällare, med koldärraggregat. (The storage of cabbage in a concrete cellar with cold air ventilation.) *Årsb. svensk. Jordbr. Forskn.*, 1950, pp. 231-44, bibl. 3, illus.

As clamps are not very satisfactory for the storage of cabbage in Sweden, an experimental concrete cellar with a capacity of 100 tons was constructed near Malmö. Cooling was effected by a system of ventilation which makes use of the cold night air. After the completion of certain improvements initial failure was turned into success, and the results obtained for the two winters of 1947/48 and 1948/49 are very encouraging. In the average of both years, losses up to the end of April were reduced to 38%, as compared with 59% in clamps, while the percentage by weight of first-grade cabbage kept to the end of the storage period was 80·3% and 53% respectively. Comparative data on cabbage composition and of temperatures in the clamp and in the cellar are also presented. Under Swedish conditions the cost of constructing the cellar would be recovered within 5 years. Illustrations support the description in the text.

2095. HRUSCHKA, H. W., AND KAUFMAN, J.

Storage tests with Long Island cauliflower to inhibit leaf abscission by using plant growth regulators.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 438-46, bibl. 1.

In storage tests conducted during 1947 and 1948 observations were made on 111 crates totalling 1,280 heads of Long Island cauliflower. Leaf abscission during storage was practically prevented by the use of different forms of 2,4-D, naphthalenacetic acid, or 50-50 mixtures of the two. These growth regulators were effective whether used as sprays or as vapors emanating from impregnated shredded paper. Some leaf injury resulted from the oil in the shredded paper. Treatments made at the time of harvest, either before or after packing, or made by spraying the plants in the field at the time of tying were about equally effective. Treated cauliflower held up well in storage (at 33° F.) for about 4 to 6 weeks, after which deterioration from

leaf yellowing and wilting, and from spotting and decay of leaves and curd made the cauliflower unsaleable. [Authors' summary.]—U.S. Dep. Agric., New York.

2096. NYASALAND DEPARTMENT OF AGRICULTURE.

The storage of sweet potatoes.

Nyasaland agric. Quart. J., 1949, **8**: 37-40.

The usual method of storage for periods of not more than 2 months is to place alternate layers of tubers and wood ash in lime-dusted pits, preferably with the addition of DDT dust to kill adult weevils on emergence. A more satisfactory method is in the form of dried slices. Sun-drying in 5-8 days is possible, but has several disadvantages. Trials showed, however, that slices could be dried in tobacco barns and produce a clean product that would keep almost indefinitely. The method used is described.

2097. MILLER, J. C., AND OTHERS.

Effect of storage on the carotene content of fourteen varieties of sweet potatoes.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 399-402, bibl. 12.

A study at Baton Rouge, Louisiana, on 14 sweet potato varieties showed a wide range in beta carotene in the roots of different varieties. From the ratio of carotene to other pigment it was clear that the principal pigment is beta carotene. In roots stored at 75° F. the beta carotene content of some varieties increased during the first month, and decreased after 4 months.

2098. SCOTT, L. E., AND KRAMER, A.

The effect of storage upon the ascorbic acid content of tomatoes harvested at different stages of maturity.

Proc. Amer. Soc. hort. Sci., 1949, **54**: 277-80, bibl. 11, being *Sci. Pap. Md agric. Exp. Stat. Dep. Hort.* A236.

With Rutgers tomatoes picked at different stages of maturity from green to red, tomatoes ripened in storage did not attain the ascorbic acid value of fruit ripened on the plant. In all treatments there was a decrease in ascorbic acid content during storage.

2099. GLASS, E. H., AND CROSIER, W. F.

The viability of seeds fumigated with an acrylonitrile-carbon tetrachloride mixture.

J. econ. Ent., 1949, **42**: 646-9, bibl. 2.

A mixture of equal volumes of acrylonitrile and carbon tetrachloride is now available as the commercial fumigant "carbacyl", used for the control of insects in stored products. Its effect on the germination capacity of many different seeds, including those of 14 vegetable species, was investigated. There was no evidence that fumigation had any immediate or delayed deleterious effect on any kind of seed, or that it had any effect on the incidence of moulds or the action of seed-protecting fungicides.—Cornell University, Geneva, N.Y.

Frozen pack.

2100. MACKINTOSH, D. L., VAIL, G. E., AND FILINGER, G. A.

Preserving foods by freezing.

Circ. Kans. agric. Exp. Stat. **249**, 1949, pp. 79.

A section (pp. 42-61) is devoted to the processes and varieties recommended for quick-freezing fruits and vegetables for home use.

2101. ADAM, W. B.
Canning fruits are not the best for quick freezing.
Grower, 1950, 33: 823, 825.

Brief descriptions are given of the behaviour of varieties of strawberries, raspberries, peas and dwarf and runner beans in quick freezing trials carried out over 4 years at Camden Research Station.

2102. ILDIS, P.
Congélation rapide des fruits et jus de fruits d'origine tropicale et subtropicale. (Quick-freezing of tropical and subtropical fruits and fruit juices.)
Fruits d'outre mer, 1949, 4: 361-70, bibl. 27, illus.

A review of the literature, mainly American, on the quick-freezing of tropical and sub-tropical fruit and fruit juices and pulp. The treatment of citrus juice and other products is described in some detail and brief descriptions are given of methods applied to figs and pineapples, and, in the Philippines, to avocados, mangoes, guavas, bananas, papaws, green coconuts, jack fruit, sweet sop, sour sop and sapodilla.

Drying.

2103. ANON.
Drying of fruits and vegetables.
Food and Agric., 1949, 2: 180-4, bibl. 8.

A general account is given of the technique of dehydration, types of driers and the effects of drying on nutritive values.

Food values.

2104. HAMAR, N.
A magyar népélelmezés táplálkozásélettani szempontból. (The nutrition of the Hungarian people.) [French summary 2½ pp.]
Bull. Fac. Hort. Buda., 1945-47, Vol. 11, 145 pp., bibl. 185.

Though this issue deals mainly with general nutritional questions, it also contains extensive tables giving the nutritional value of various fruits and vegetables.

2105. MONEY, R. W., AND CHRISTIAN, W. A.
Analytical data of some common fruits.
J. Sci. Fd Agric., 1950, 1: 8-12, bibl. 1.
Results are given of the analysis of numerous samples of commonly occurring fruits examined over the period 1925-48.

2106. FRANKLIN, D., LYONS, F. B., AND WHEELER, T. S.
The determination of carotene in dried peas.
Analyst, 1950, 75: 49-54, bibl. 49.

A rapid two-stage chromatographic method is described for the determination of total carotene (about 3 p.p.m.) in dried peas.

Processing and products.

(See also 1296, 1350, 1388, 1595, 1699, 2127.)

2107. SMITH, C. M.
Cantaloupes canned in Australia.
Canning Ind., 1949, 19: 225: 23.
Cantaloupe canning.
Canad. Fd Ind., 1949, 20: 12: 19.

Successful experimental cannings of cantaloupes were carried out in Australia, by the New South Wales Department of Agriculture and the C.S.I.R.O. Melons were packed alone, and in 2 mixed packs. Of the 17 varieties tested, best results were given by Arizona 13, U.S.D.A. 8, Pride of Wisconsin, U.S.D.A. 5, and Hearts of Gold.

2108. COETZEE, W. H. K., AND OTHERS.
The utilization of citrus peel for pectin manufacture.
Fmg S. Afr., 1950, 25: 64-6, bibl. 5.

Studies on Valencia orange and grapefruit peel showed comparable results. Yields of pectin averaged about 30 lb. per short ton of fruit with an average jelly-grade of 175. Similar results were obtained using wet and dry peel. Methods of extraction used are described.

2109. ANON.
Gur making from coconut palm.
Bull. Indian centr. Cocon. Cttee, 1950, 3: 63-6.

Coconut gur or jaggery is the crystalline substance obtained from boiling the spathe sap (Neera). The method used in Western Madras of tapping, collecting, adding lime, and boiling is described.

2110. KHANNA, K. L., AND CHACRAVARTI, A. S.
Studies in storage of gur—I.
Proc. Indian Acad. Sci., Sect. B, 1949, 30: 99-119, bibl. 7, illus.

In studies made at the Central Sugarcane Research Station, Pusa, Bihar, gur made from several varieties of cane was subjected to different storage treatments, amongst which best protection was afforded by the use of furnace ash. Changes in physical and chemical attributes of gur during storage are tabulated and discussed.

2111. KARUNAKARAN, K. C.
Coir.
Indian Cocon. J., 1949, 2: 170-83.

This article is a contribution to the Dictionary of Economic Products and Industrial Resources of India and outlines methods of extracting, processing and utilizing coir, with production figures for different parts of India.

2112. COETZEE, W. H. K., AND OTHERS.
Guava juice and guava sweets.
Fmg S. Afr., 1950, 25: 20-2, bibl. 6.

Investigations are reported on the preparation of guava juice and sweets. The guava is the highest known source of vitamin C among fruits. Effects of different methods of preservation on the vitamin C content are tabulated.—Fruit Res. Stat., Stellenbosch.

2113. THOMPSON, P.
The pickling and canning of olives.
Food Pres. Quart., 1949, 9: 51-6, bibl. 6.
In America 5 varieties of olive have been found suitable

for commercial processing: Mission, Ascolano, Sevillano, Manzanillo and Barouni. Standards are set for each variety and careful hand picking is necessary to obtain fruit of correct maturity. It is customary to size grade the olives before pickling. Processing is described.

2114. MOITREL, P.
L'huile d'olives. (Olive oil extraction mills.)

Oléagineux, 1950, 5: 243-7, bibl. 13, illus.

The old method, in which whole olives are crushed, and the Acapulco process, in which pulp and seeds are first separated, are described with the aid of diagrams. The yields of oil obtained are almost identical.

2115. KEHREN, L.
L'huile de bancoulier (*Aleurites moluccana*) et ses propriétés siccatives. (The oil of *A. moluccana* and its drying properties.)
Oléagineux, 1950, 5: 359-63, bibl. 6.

Analyses made at Pobe, Dahomey, of the oil of *A. moluccana* shows it to possess good drying properties resembling those of linseed oil rather than those of other tung species. This property can be further improved by preliminary heat treatment. Extraction of the oil by grinding and expression presents no difficulty, and, as it has been easily acclimatized, the species is suggested for planting in areas where *A. fordii* does not succeed.

2116. WALAWALKAR, D. G.
Sulphanilamide as a preservative for sweet juices from palm trees.
Nature, 1950, 165: 370.

The juice of palm trees (date, brab, coconut and sago), which contains 10-14% sucrose, might be a substitute for cane sugar, thus releasing fertile land for cereals. The addition of 10-60 p.p.m. sulphanilamide (40-250 mg. to a gallon) was found to preserve the juice in its fresh condition for 5-20 days.—Indian Institute of Sugar Technology, Kanpur, U.P.

2117. COOK, H. A., AND KILBY, M. M.
Compound and single clarification compared at Kohala Sugar Company.
Hawaii. Plant. Rec., 1949, 53: 75-7, bibl. 1.

Comparative tests showed no significant advantages in favour of the more costly compound clarification method.

2118. COOK, H. A., AND KILBY, M. M.
Filtrate recirculation from a rotary vacuum filter measured.
Hawaii. Plant. Rec., 1949, 53: 89-92.

A series of measurements indicated a reduction of up to 17.3% in the grinding rate of sugar cane due to inoperative filter surface that was not kept clean by scrapers. The study indicated the desirability of establishing an insoluble solids balance periodically to determine the efficiency of the filter operation.

2119. CLARKE, I. D., AND OTHERS.
Tannin content and other characteristics of native sumac in relation to its value as a commercial source of tannin.
Tech. Bull. U.S. Dep. Agric. 986, 1949, pp. 76, bibl. 25, illus., 25 cents.

The studies described here arose out of the shortage of domestic supplies of vegetable tannins and uncertainty regarding imports. Eight species of sumac, *Rhus* spp., found wild in the eastern and southern U.S. were studied to determine their tannin contents and abundance, and they are described briefly with the aid of photographs. Results of analyses are tabulated in full. A high tannin content was found in leaves, leaflets and flowers, and a low content in petioles, rachises, stems, bark, wood and seeds. The three most promising species, *R. copallina*, *R. glabra* and *R. typhina*, were subjected to a statistical study to determine the effects of various genetic and environmental factors on the composition of their leaves. *R. trilobata* might also prove of value under certain circumstances.

2120. JACOBS, P. B.
Industrial alcohol.
Misc. Publ. U.S. Dep. Agric. 695, 1950, pp. 101, bibl. cited 46+6 pp. refs., illus.

This represents a fourth revised and expanded edition of an earlier publication. Its subsidiary title is "A study of the technology, production and uses of alcohol in relation to agriculture". Among the points discussed are the following actual or potential sources of alcohol: Sugar cane and molasses, sugar beet, citrus molasses, fresh and dried fruits, grain crops, potatoes, sweet potatoes, Jerusalem artichoke, cacti, cassava, arrowroot and sago. The production of alcohol from farm products might have as objectives either the recovery of all possible values from materials not economically used at present or the stabilization of crop prices. There are, however, many problems to be answered before a general programme can be started, and as an approach to the study of these problems the Bureau of Agricultural and Industrial Chemistry is operating a small experimental alcohol plant at Peoria.

Noted.

2121.
a BARKER, C., AND OTHERS.
African drying oils. Component acids of some linoleic-rich oils. II. Niger seed [*Guizotia abyssinica*] oil. III. Safflower seed oil. IV. Sunflower seed oil.
J. Soc. chem. Ind. Lond., 1950, 69: 13-15, bibl. 7; 15-16, bibl. 14; 16-20, bibl. 14. For Part I dealing with *Tetracarpidium conophorum* seed oil see *Ibid.*, 1947, 66: 293-6; *H.A.*, 18: 752.
b BICK, I. R. C., EWEN, E. S., AND TODD, A. R.
Alkaloids of *Daphnandra* species. Part II. Daphnandrine, daphnoline, and aromoline.
J. chem. Soc. Lond., 1949, pp. 2767-74.
c BROWN, G. B.
The effect of winter storage on the carotene content of carrot varieties.
Proc. Amer. Soc. hort. Sci., 1949, 54: 304-6, bibl. 3.
d DESIKACHAR, N., AND RAO, B. L.
Preservation of the coconut poonac [coconut cake].
Indian Cocon. J., 1949, 2: 185-91.

- e DURMIŠIDZE, S. V.
Quantitative determination of oenin in grapes and in wine. [Russian.] *Biohimija* (Biochemistry), 1948, 13: 16-22, bibl. 12 [received 1950].
- f FLORY, W. S., Jr.
Transposition of green and dry weights of English peas. *Proc. Amer. Soc. hort. Sci.*, 1949, 54: 286-90, being *Pap. tech. Ser. Texas agric. Exp. Stat.* 1235.
- g GANE, R.
The water relations of some dried fruits, vegetables and plant products. *J. Sci. Fd Agric.*, 1950, 1: 42-6, bibl. 9.
- h GUENTHER, E., AND LANGENAU, E. E.
Essential oils and related products. *Analyt. Chem.*, 1950, 22: 210-15, bibl. 93. A second review of the literature on analytical procedures. For the first see *Ibid.*, 1949, 21: 202-7.
- i JENSEN, C. O., AND PARMELE, H. B.
Fermentation of cigar-type tobacco. *Industr. Engng Chem.*, 1950, 42: 519-22, bibl. 22.
- j KING, H.
Curare alkaloids. Part X. Some alkaloids of *Strychnos toxifera* Rob. Schomb. *J. chem. Soc. Lond.*, 1949 pp. 3263-71.
- k KROPMAN, M., AND WARREN, F. L.
The *Senecio* alkaloids. Part V. The structure of senecic acid. *J. chem. Soc. Lond.*, 1949, pp. 2852-4.
- l LEWIS, R. D. [AND U.S. DEP. AGRIC.].
Cost of handling Texas citrus, fresh and processed, with comparisons for Florida, 1946-47. *Bull. Tex. agric. Exp. Stat.* 709, 1949, pp. 23.
- m LÜTHI, H.
Über die Bedeutung der alkoholfreien Obst- und Traubensäfte in der Schweiz. (The economic position with regard to fruit and grape juices in Switzerland.) *Schweiz. Z. Obst- u. Weinb.*, 1950, 59: 202-6.
- n ROBERTS, E. A. H.
The fermentation process in tea manufacture. 10. The condensation of catechins and its relation to the chemical changes in fermentation. *J. biol. Chem.*, 1949, 45: 538-42, bibl. 12.
- o ROY, S. C., AND JOSHI, B. C.
Manufacture of palm candy. *Indian Fmg.*, 1949, 10: 325-9.
- p RYGG, G. L.
Changes in carotenoid content of harvested carrots. *Proc. Amer. Soc. hort. Sci.*, 1949, 54: 307-10, bibl. 17.
- q SCOTT, L. E., AND KRAMER, A.
Physiological changes in asparagus after harvest. *Proc. Amer. Soc. hort. Sci.*, 1949, 54: 357-66, bibl. 9, being *Sci. Pap. Md agric. Exp. Stat. Dep. Hort.* A.235.
- r SINCLAIR, W. B., AND CRANDALL, P. R.
Carbohydrate fractions of grapefruit peel. *Bot. Gaz.*, 1949, 111: 153-65, bibl. 23.
- s STENSTRÖM, M.
Grönsakskonserveringens utveckling i Sverige. (Vegetable canning in Sweden.) *Årsb. svensk Jordbr. Forskn.*, 1950, pp. 216-22.
- t THOMPSON, A. H., AND SCHRADER, A. L.
Chemical changes during storage of dehydrated Stayman Winesap apples as influenced by storage temperature and pack atmosphere. *Proc. Amer. Soc. hort. Sci.*, 1949, 54: 73-80, bibl. 7.
- u TILDEN, D. H.
Studies on the recovery of insects and insect parts from fig paste by certain procedures. *J. Ass. off. agric. Chem. Wash.*, 1950, 3: 109-14, bibl. 3.
- v WOODROOF, J. G., AND DUPREE, W. E.
Processing Georgia pears. *Bull. Ga Exp. Stat.* 262, 1949, pp. 13.

NOTES ON BOOKS AND REPORTS.

Books and reports.

2122. THE ASSOCIATION OF BRITISH INSECTICIDE MANUFACTURERS.
British Insecticides and Fungicides for Crop Protection. Directory 1950.
166 Piccadilly, Lond., 1950, 10×7½ in., pp. 124.

What the Association stands for is here set out in 6 languages. The report should be of considerable value to the practising horticulturist who wants to know where to obtain particular substances. In addition the portrayal in colour of different stages of development with reference to spraying of gooseberry, black currant, raspberry, cherry, pear, plum and apple will also be welcomed by the fruitgrower. Short general notes are given on such groups of substances

as seed dressings, plant growth substances, poison baits, etc. Especially useful to an Information Bureau are the foreign names [French, Spanish, German, Portuguese, and Russian] of different chemical products and the brief descriptions of certain proprietary substances.

2123. BATES, G. H.
Weed control.
Farmer and Stockbreeder Ltd., E. and F. N. Spon Ltd., Lond., 1948, 5½×8½ in., pp. 236, bibl. 101, plates 20, price 16s.

Such great progress has been made in recent years in the science of weed control, and information on the use and effects of herbicides is so scattered and variable, that the grower may often be at a loss to know how best to fit the findings of research into his traditional

system of husbandry. In this much-needed and eminently practical book, Dr. G. H. Bates, Principal of the Staffordshire Farm Institute, reviews the subject in all its aspects, and helps the farmer to evaluate modern methods and to make the best use of the equipment and materials at his disposal. Since the advent of chemical and hormone weedkillers, there has been a tendency in some places to neglect the preventive measures of cultural control and to rely solely on chemicals to solve the weed problem. The author, however, lays great stress on the importance of intelligent cultivation, his recurrent thesis being "prevention is better than cure". Implements, old and new, their uses, and local cultural practices are discussed. Of special interest are the discussion and suggestions made for improvement of hand tools, which the author considers are often "crude devices badly designed for the work for which they are required". Chemical methods of control, however, are in no way underrated, and recent work in this field is well summarized. A review is given of the chief chemical herbicides, their mode of action and methods of application, including the "smear method", designed by the author, for controlling bracken and creeping thistle. Much attention is paid to the ecology of weeds and their distribution, discussion of the individual species being divided into weeds of arable land, weeds of meadow and pasture, weeds of uncultivated land, and weeds that are of serious consequence in definite areas as distinct from those of wide distribution. Control on railways, water-courses and waste land is also dealt with, as the author sensibly contends that the weed problems of our small and highly industrialized island must be regarded as a whole. Probably this book will be of greatest value to the farmer, for although the fundamentals of weed control are the same for farm and garden, specific horticultural problems are dealt with only in one rather inadequate chapter, concerned mainly with weed control on lawns and garden paths and in clumps of perennials, onions, bulbs and asparagus. The bibliography, to which frequent reference is made in the text, is well selected and not too cumbersome.

P.R.-D.

2124. BIOLOGICAL COUNCIL [MARSH, R. W., AND KENT, F. L.].

A list of abbreviations of the titles of biological journals.

H. K. Lewis & Co., 136 Gower Street, London, W.C.1, pp. 26, 2s. 8d. post free.

This list of over 700 titles is commended to the notice of all writers of biological papers and editors of biological journals. Since the donkey work is now admirably accomplished, could we persuade the compilers in a future edition to add also the place of issue of the publications as is done in the yearly Index to *Horticultural Abstracts*, and even—but perhaps this would be the last straw—the exact addresses? It would then be of tremendous value not only to writers but also to readers of papers.

D.A.

2125. BISSET, K. A.

The cytology and life-history of bacteria.

E. & S. Livingstone Ltd., Edinburgh, 1950, 10×7 in., 136 pp., bibl. numerous, illus., 18s. 6d.

The purpose of this book is "to present a reasoned

case for regarding bacteria as living cells with the same structure and functions as other living cells, and to correlate the available information upon the various types of bacteria". It has no direct bearing on agriculture or horticulture, but the plant pathologist who is studying bacterial diseases of plants will find much to interest him here.

H.W.

2126. CANADIAN COMMITTEE ON FOOD PRESERVATION.

Collected Papers of the Canadian Committee on Food Preservation, Vol. 4, 1949, 10×7 in., containing Papers 171-230, issued 1947-1949.

Two papers from *Scientific Agriculture* by Grant on Apples as a source of vitamin C, and by MacArthur on Frozen pack of asparagus, previously abstracted in *H.A.*, 17: 1939 and 18: 2273, and one from *Refrigerated Engineering* by Phillips on Freezing rates of fruits and vegetables, noted in *H.A.*, 18: 716b, are reproduced.

2127. CHARLEY, V. L. S.

The principles and practice of cider-making. Being an annotated translation of "La cidrerie" (by G. Warcollier).

Leonard Hill, London, 1949, 8½×5½ in., pp. 367, illus., 35s.

The third and last edition (1928) of the late Professor Warcollier's book, *La Cidrerie*, gives a comprehensive and authoritative account of the principles and practice of cider-making. No comparable book in English is available, although the need for such a work is great. This translation of the standard French work by so eminent an authority on cider-making as Dr. V. L. S. Charley is therefore doubly welcome. Dr. Charley studied the subject during his fifteen years at the Research Station, Long Ashton, during which time he became closely acquainted with cider makers and their methods and, in addition, gained a first-hand knowledge of the methods of cider-making as practised in France and in other countries, e.g. Switzerland and Germany. The translator has drawn freely upon his wide knowledge of the subject and has modified the text when necessary to bring the description up to date, so that his book is both authoritative and applicable to present-day practice. The early chapters of the book describe the history of cider-making (briefly), review present-day French Cider Statistics and give an account of the composition of the apple, methods of storage, and of the organization of cider factories and fruit supplies. The interest of the grower as well as that of the cider maker is thus early stimulated. A list of cider apple varieties now officially recommended for planting in England is given in a Translator's Addendum (Chapter IV) and also a note on the growing of cider apples as bush trees. Great attention has always been paid in France to methods of extracting the juice from the apple, and four chapters are devoted to this aspect of cider-making; milling of the fruit, maceration of the fresh pulp, pressing and juice extraction by diffusion, all being adequately and informatively described. Dr. Charley comments on the merits of these processes and on the extent to which they are practised to-day: e.g. "France is the only country where maceration still remains a process in commercial use" (page 76); "Diffusion has not increased its popularity in the past twenty years and

is now only used for the production of dilute forms of cider" (page 108). Such translator's notes appear at the end of most chapters and are of very great value to the reader.

Preliminary purification of the juice is described in Chapter IX, and the possible value of such treatment is illustrated by the following quotation pertaining to keeing: "organisms causing maladies and disorders are removed to a great extent and the juice is recovered in an ideal form for true fermentation and to give a cider of quality and sound keeping properties" (page 118).

Primary fermentation by the yeasts naturally present and post-fermentative clarification are informatively described; in the opinion of the reviewer there is a need for much further work on the factors which determine the course of fermentation. Fermentation by selected yeasts (so widely practised in Switzerland) is also described, but here that clarity of expression so typical of the book as a whole is not so marked.

There are some inaccuracies in the chapter on disorders of cider, e.g. the disorder caused by *Mycoderma vini* should not be described as "bacterial in nature" (page 274), and in fig. lxxviii the organism depicted in the left half of the diagram is named as though it were in the right half and vice versa. The description of cider sickness as understood here and in France might perhaps be put more clearly, but our present-day knowledge of this disorder is far from complete. In spite of these comments the chapter is of considerable interest and value.

The chapters on sparkling ciders and on special methods of cider-making are of particular interest. Sweet cider, a type very popular in France, where the addition of sugar is prohibited, is discussed at some length, and the production of *naturally sweet cider* and cider sweetened by the addition of unfermented apple juice are both described. This latter method of sweetening cider is indicative of the close liaison which exists in France (and also in Switzerland) between cider-making and apple juice manufacture. The apple juice manufacturer will also be directly interested in the chapter on the production of apple juice and of concentrate. The glut of cider fruit during the past cider-making season will focus attention upon concentration of apple juice as a means of utilization of surplus fruit for cider-making and/or apple juice production.

Almost every aspect of cider-making is described in this book, including composition and analysis, pasteurization, transport of cider, and by-products of the cider-making industry, for pectin extraction and as a food for livestock.

Reference has been made to a few mistakes and to these must be added the incorrect use of the word "ethers" which is frequently used to describe "esters", e.g. pages 148 and 149. Yet these errors do not seriously detract from the value of the book and indeed the text is most lucidly written in a manner expected from one who is a master of his subject. Furthermore, the text is adequately illustrated with excellent diagrams and photographs.

This valuable book will stimulate the interest of, and will help materially, all those directly or indirectly concerned with cider-making. *La Cidre* has long been the standard reference book on cider-making

in France, and indeed in the whole world, and Dr. Charley's manual will undoubtedly achieve a similar high status in English speaking countries.

S.W.C.

2128. CHILEAN IODINE EDUCATIONAL BUREAU.

Iodine and plant life.

Chilean Iodine Educational Bureau, Stone House, Bishopsgate, London, E.C.2, 1950, 7½ × 10 in., pp. 114, refs. 794.

This work consists of an annotated bibliography of the literature in many languages published in different parts of the world, from 1813—soon after the discovery of iodine—to 1949 inclusive, together with a clear, short review of the more important conclusions or deductions to be drawn from it.

A discussion of the varying, but on the whole large, amounts of iodine found in seaweeds is followed by one on the content found in different land plants. It may be noted that watercress has a relatively high one, viz. 45 µg. per 100 g., and that *Feijoa sellowiana* heads fruits with the remarkable content of 894 µg. per 100 g. There is evidence to show that the iodine content of plants can be increased by iodine application in the field or in pots. But whereas the average iodine content of a heavy textured fertile loam or clay or highly acid soil rich in organic material is naturally very high, that of sandy soils rarely exceeds 1 part per million. This should be borne in mind when preparing nutrient media.

The effect of spraying various iodine compounds on crops and of application to seeds is considered with reference to certain plants, including vegetables and hops. Iodine is contained in many of the new herbicidal growth substances and in particular it intensifies the herbicidal qualities of phenoxyacetic acid and its derivatives. It would appear not to have been used in hydroponic solutions except by Matlin of Los Angeles. In plant protection it has proved useful in minor ways such as in the disinfection of potato cutting knives, and the success of solutions containing free iodine for the control of certain plant diseases is noted. Little success, however, has attended the use of iodides or iodates in the field. It has been successfully used for impregnating fruit storage wraps and crêpe paper plugs in boxes of transported grapes.

There is an author and a short subject index. The book should prove most useful for reference.

[A 13-page précis of the book by F. C. Kelly is issued in *Information* (the mimeographed publication of the company) for February 1950.] D.A.

2129. COOKE, F. C.

The pineapple industry of the Hawaiian islands.

Published as *General Series, Department of Agriculture, Malaya*, 32, 1949, 9½ × 6 in., pp. xiv+118, bibl. 8 pp., illus., \$5.

The sub-title of this book is a "Report on a visit to the United States and the Hawaiian islands to study the Hawaiian pineapple industry, with recommendations for the development of the Malayan pineapple industry". The subject is dealt with on a broad basis as the following headings show: *General*: History, geography, population, climate, geology, soils and the history of the pineapple industry. *Field practice*:

(1) Soil conservation, including terracing, contouring

and field planning, (2) plantation operations including rotations, soil preparation, mulching and soil fumigation, (3) planting, varieties of pineapples, planting material, nurseries, planting seasons, planting operations and systems, cultivation and weeding, fertilizers, pest control, harvesting, ratooning, use of hormones and damage in field, (4) mechanization in the field.

Cannery practice: Fruit preparation, packing, processing and warehousing. **Subsidiary industries and by-products:** Includes the problem of pineapple waste and the use of pineapple feeding stuffs. **Research:** Organization, etc. **Commercial organization. Recommendations relating to Malaya:** Hawaiian methods cannot be applied wholesale to Malaya where conditions in many respects are quite different, but there are a number of ways in which the Malayan industry, being re-built after the war, could be modernized and so be able to compete successfully in world markets. Many of the otherwise excellent photographs are largely spoiled by the very inferior paper on which they are printed.

G.K.A.

2130. DURUZ, W. P.

Principles of nursery management.

A. T. de la Mare Co. Inc., New York, 1950,
9½ × 6 in., pp. 125, illus., \$3.50.

This little book should encourage the established nurseryman to overcome his reluctance to refresh himself by a course of wider reading and probably herein lies its chief value. At the same time the newcomer will find a concise outline of the origin and *raison d'être* of nurseries. Experience in teaching this subject has enabled the author to list selected sources of further information on every aspect of the business. The principles which govern the choice of site are discussed in some detail and there are some useful chapters concerned with the final product, under the headings grading, storing and shipping, disease control regulations, marketing and office routine; all containing information often eagerly sought but rarely found. The illustrations are well chosen. An aerial view used as an end paper, showing the layout of a well organized roadside nursery "shop", is a most impressive climax to the author's counsels.

R.J.G.

2131. ELEY, G. [Editor].

In your garden. A selection of broadcast talks [by different authorities].

Littlebury & Co. Ltd., Worcester, 1950,
8½ × 5½ in., pp. 113, illus., 10s. 6d.

A small book invaluable to the English amateur gardener for the solution of many of his problems.

2132. EUROPA PUBLICATIONS LTD.

The world of learning 1950.

Europa Publications Ltd., Bloomsbury
Street, London, W.C.1, 1950, 10 × 7½ in.,
pp. 881, £3 3s.

The compilation of a complete list of the establishments and personnel composing the "world of learning" becomes yearly more difficult. The present publication, the third edition in the series, is almost bound to be disappointing on points of detail to those working in particular fields of agriculture or horticulture. The compilers must depend not so much on the terms of their questionnaire as on the extent or way in which answers are given. This fact is apparent from a

consideration of the details given on three English horticultural research centres. Thus, for East Malling we are given the names of the director and the librarian and the facts that research staff number 62, that an annual report is issued and that another publication is the *Journal of Horticultural Science*. A very slightly longer note is given of the activities of Long Ashton and the names of both secretary and librarian are given. No mention is made of an annual report or of the fact that Long Ashton is equally concerned with East Malling in the *Journal of Horticultural Science*. As regards the John Innes Horticultural Institution the names of heads of departments are given together with a note on its aims and number of staff. Briefly, then, the information is uneven. Despite this, it should generally suffice for anyone who wishes to get in touch with a particular institute or branch of science in any given country, and the book is, therefore, of considerable reference value.

D.A.

2133. FAULKNER, R. P.

The science of turf cultivation.

Technical Press Ltd., Gloucester Road,
Kingston Hill, Surrey, 1950, 8½ × 5½ in.,
pp. 64, illus., 7s. 6d.

This slender book should be very valuable both to the amateur gardener and to groundsmen of bowls, cricket and other sports clubs. The author considers in turn soil reaction, nutrition, manuring, grass varieties, weeds and weed killing, pests and diseases and the actual making of a lawn. He does not dot all his "i's" or cross all his "t's", and in the reviewer's opinion the book should be regarded as a sound basis for practical experience in the art of lawn making and tending, rather than a complete textbook on the subject.

D.A.

2134. FREE, M.

All about house plants.

The World's Work (1913), Kingswood,
Surrey, England, 1950, 8½ × 5½ in., pp. 329,
pls 47, 25s.

A book from U.S.A., written with terrific enthusiasm and competence by an eminent horticulturist who, it is gratifying to learn, laid the foundations of his distinguished career crocking pots in England. Over 1,000 varieties of alleged house plants in some 300 genera are described at greater or less length, leaving one dazed Britisher at least with the impression that to cope with it all the American interior must be permanently embowered in a lush vegetation, the windows fringed with cacti, the rafters dripping "vines".

Thorough is the watchword. In the eleven cogent chapters devoted solely to general cultivation nothing has been omitted that might promote the plant's well-being or delay its demise. The precautions include a lengthy tabulated "battle plan" against bugs and blight. This is just a beginning. House plants, it seems, fall into nineteen different categories, each with its particular cultural needs. These are meticulously recorded. And then there are plant lists. Lists of easy plants, of indestructible "toughies", lists of plants for north, south, east and west windows and almost every other part of the room, for terrariums, bottle gardens and turnip baskets, for plates, dishes and assorted domestic crockery. All tastes are considered,

from Big Business, which must have its orchids, to the humbler types whose horticultural aspirations are fulfilled by a carrot top sprouting in a saucer. The book is written with a light touch which makes it very readable. Botanical nomenclature is used throughout, but where they exist the vernacular names are included. Some pleasant moments can be had by those unacquainted with the language in speculating as to the identities of Pussy Ears and Pussy Toes, Moses on a Raft and Hearts Entangled, to quote but a few of the many pleasing popular titles. We learn that the plant known as Mother-in-Law is thus unkindly styled because a small dose of it renders the taker speechless. The book is written for American conditions and published here unaltered. Even so, if allowance is made for the differences between the climate of the American domestic interior and our own and for the certainty that the average window gardener in this country will never have heard of at least three-quarters of the plants mentioned, the book still remains well worth possessing. As a compendium of successful pot plant cultivation by every conceivable method from the normal to the fantastic and in every kind of surrounding from greenhouse to garret the book is unique. There are numerous excellent and useful illustrations, many of them coloured. G.St.C.F.

2135. GÄUMANN, E.

Principles of plant infection.

(Authorized English Edition, edited by W. B. Brierley.)

Crosby Lockwood & Son Ltd., London, 1950, 10×6 in., pp. xvi+543, bibl. numerous illus., 63s.

When Professor Gäumann's *Pflanzliche Infektionslehre* appeared, early in 1946, it was very favourably reviewed in a number of British scientific journals. See particularly the *Annals of Applied Biology*, Vol. 33, pp. 336-7, where Professor W. B. Brierley wrote: "It will be little short of a tragedy if this volume does not find rapid translation into English so that it may reach the widest possible circle of readers, for its influence on the development of plant pathology in our time should be incomparable." Whereupon Mr. J. W. Wilson, chairman of Crosby Lockwood & Son, publishers of a series of agricultural and horticultural books, decided to produce an English translation. An interesting account of the steps taken to achieve this appears in the Prefatory Note to this English edition. Professor Brierley himself edited the translator's scripts and this is itself a guarantee of the high literary quality of the presentation in the edition now issued. Scientists to-day rely largely on the various abstracting journals for information on the results of other workers, and it would appear that relatively few read scientific books and periodicals in foreign languages. A translation from the German of an authoritative work on the principles underlying plant infection and resistance to disease is thus an event in British scientific publication, particularly as it collates the work of hundreds of workers in this field of study in various countries.

The scope of Gäumann's book has already been outlined for our horticultural readers [*H.A.*, 17:492] who must be reminded that it reviews the principles underlying the host/parasite relations in infection,

relations that must be thoroughly understood if rational control of disease is to be practised. It is thus not a textbook of instruction on disease control, though the last chapter on "The control of infectious diseases of plants" does indicate the lines along which control must be sought.

Certain sections of the book, however, do have a definite economic or horticultural bearing. Thus under "Human dispersal of pathogens" important diseases of horticultural plants are mentioned that have come from America or eastern Asia, as a result of trade. As intercommunication between countries is becoming easier and more rapid, so the chances in favour of introducing a disease to another country are greatly increased and special precautions must be taken, particularly with regard to diseases that may be carried on nursery material. The history of the distribution of the currant rust with reference to the dispersal by man's agency of the alternate hosts, the five-leaved pines, is an interesting example and is described at some length (pp. 145-8). One short section on "The influence of grafting on the disease proneness of the host" gives instances of how the stock may affect the disease disposition of the scion, one interesting point being that "the wood of pome and stone fruit trees matures less completely on strongly growing stocks, hence its frost-hardiness diminishes". Comparisons and contrasts between diseases of man and plants are frequently made as in the section on "The influence of nutrition on the disease proneness of the host", and in the "morphologic-anatomical manifestations" of gall and tumours (pp. 453-7).

The scientific names of certain flowering plants, fungi, bacteria, etc., used by Professor Gäumann have been retained, but, since many of them are not familiar to workers in Britain and the United States, Professor Brierley has written an appendix for the English edition giving the more commonly accepted names.

The wealth of information on the physiological reactions in plant disease now available in English renders this book indispensable to the agricultural and horticultural botanist for reading or for reference. Its high price will prevent its purchase by most students, but it should be on the shelves of every library visited by students of the biological sciences, and it should be readily accessible in every plant pathology laboratory.

H.W.

2136. JOUTS, E., LE GRAVEREND, E., AND RÉGNIER, R.

Les vergers de grand rendement. Pommier—poirier—prunier—cerisier. (The cultivation of top fruits, apples, pears, plums and cherries.)

La Maison Rustique, 26 rue Jacob, Paris (VIe), 2nd edition 1948, 10½×7½ in., pp. 468.

The first edition of this admirable book on commercial fruit growing in France was reviewed in *H.A.*, 17: 2767. Since then substantial improvements have been made both in the presentation and the text. Bad paper and poorly reproduced photographs no longer mar the reader's pleasure. Gaps have been filled by the addition of information on mulching, toxic orchard soils, the recognition of mineral deficiencies and the use of synthetic organic insecticides. Two complete new sections have been included, one on the factors

to be considered when planning a modern commercial orchard, and the other on the association of trained trees with plantations of orchard trees, special attention being given to the "arcure" form of training. Information on pest and disease control, packing, and spraying machinery has been brought up to date.

P.R.-D.

2137. MATHESON, J. K., AND BOVILL, E. W.

East African agriculture.

Oxford University Press, London, 1950,
8½ × 5½ in., pp. 332, illus., 25s.

Two enterprising heads of a well known commercial organization have combined to produce this long needed and admirable book on European and native agriculture in Kenya, Uganda, Tanganyika and Zanzibar. Their aim has been to produce, not an authoritative textbook or instruction manual, but a descriptive account of agriculture as it exists in East Africa to-day, in short to tell the reader, not how crops should be grown, but how they are being grown. In their brief survey of the agriculture of so vast a territory the compilers have shown much skill and good judgment. The volume is divided into three main parts, the sub-divisions of which are written by various authorities, some of them past or present members of the agricultural services, others experienced farmers or business men. Part 1, which is introductory, deals briefly with such background subjects as geography, land tenure, white settlement, native labour and welfare, soil conservation, and the all too few agricultural research institutes in a vast territory. Part 2, which is by far the largest, deals much more fully with the so-called European agriculture of East Africa and includes sections on the following plantation and horticultural crops: cinchona, coffee (arabica and robusta), essential oils (clove, geranium, lavender, orange, etc.), temperate fruits (in the highlands), papaw (for papain production), passion fruit, pyrethrum, rubber, seed growing (vegetables and flowers), sisal, sugar, and tea. It is particularly fitting, as well as pleasing, to find that the chapter on pyrethrum is written by that tireless experimenter, Captain Gilbert Walker, whose enterprise resulted in founding the East African pyrethrum industry, a valuable asset and a good dollar-earner. Another notable chapter is the excellent account by F. M. Rogers of the emergency wartime production of ceara rubber on long-abandoned plantations. This successful venture had its ironical side, since most of the plantations had been established some 40 to 50 years previously by German planters who failed to discover proper methods of tapping ceara rubber, which differs considerably from hevea. The chapter on seed growing concerns another successful wartime venture which may well develop into a lucrative minor industry. The short chapter on deciduous fruits, and the accompanying list of suitable varieties, should be of special interest to fruit growers in East Africa, and elsewhere, who are faced with the peculiar problems and difficulties found in equatorial highlands where prolonged dormancy, resulting in delayed foliation, may occur in those varieties whose winter chilling requirements are not satisfied. Part 3 is devoted to valuable accounts of African agriculture in the different territories. These accounts, containing details of African life and customs, should be of real

value to sociologists, as well as to those concerned with the improvement of native agriculture. The chapter on Zanzibar agriculture includes a short account of the unique clove industry of that island and Pemba. The several appendixes incorporate geographical data and statistics of rainfall, temperature, population and exports, together with notes on keeping estate accounts and statistics, the feeding of African labourers, and the different weights and measures used in East Africa, British, metric, Arabic and Indian. There are useful tables, maps and charts showing: the number of trees per acre at different spacings, population distribution, physical features, temperature ranges, natural vegetation, rainfall, barometric pressure and the direction of prevailing winds. Most of the 30-odd illustrations are excellent and the index is good. The tables of production statistics are valuable, but not easy to compare owing to the lack of a uniform system for recording agricultural statistics throughout East Africa.

All profits from this excellent book are to be presented to the East African branch of the British Legion of Ex-servicemen. A.G.G.H.

2138. MUNDKUR, B. B.

Fungi and plant disease.

Macmillan & Co. Ltd., London, 1949,
9 × 6 in., x+246 pp., bibl. numerous, illus.,
16s.

As Indian students of plant diseases have had to rely on works published in England and America, the writer has issued this book primarily for agricultural and horticultural students in India. The first five chapters outline the morphology and reproduction of fungi, the metabolic processes in fungi, diseases caused by fungi, methods of studying plant diseases, classification and naming of fungi. Later chapters deal with specific diseases caused by fungi, bacteria and viruses, and with the principles of disease control. The diseases described include a number encountered only in India and other tropical regions, e.g. rhizome rot of ginger, stem-rot of papaya, koleroga of areca palms, seedling blight of castor, leaf blight of coffee, tikka disease of groundnut, grey blight of tea (*Pestalotia theae*), etc. Surprisingly, however, blister blight of tea (*Exobasidium vexans*), which has been so destructive in recent years in India and Ceylon, is not mentioned. The book is very clearly printed and there are many illustrations, including a striking photograph of a papaya plant affected by leaf-curl. Intending students of tropical phytopathology will find it a useful introduction to the subject. H.W.

2139. OLDHAM, C. H.

Vegetable grower's guide.

Crosby Lockwood, London, 1950, 8½ × 5½ in., pp. 472+xvi, illus., 25s.

This latest addition to the Agricultural and Horticultural Series published by Messrs. Crosby Lockwood is in every way up to the very high standards of presentation set by its predecessors. As Professor Stoughton has stated in the Foreword, reliable textbooks on vegetable cultivation can be counted on the fingers of one hand, and the industry will examine with considerable interest any book which makes a serious attempt to co-ordinate the diverse experiences and wisdom of vegetable growers throughout the country. Mr. Oldham is an Advisory Officer of great experience

and he has in the course of his work had particularly good opportunities of collecting and interpreting this information. The Guide comprises 46 chapters and three short appendices; the first 45 chapters are each concerned with a particular vegetable crop, while the last chapter gives a summary of Pests and Diseases. Strangely enough the 45 vegetables do not include what the general public would surely regard as the "number one" vegetable—potatoes. We must assume that Mr. Oldham, like several other writers, has elevated or relegated this crop (according to one's particular outlook) to the status of a farm crop. It is a pity, for most vegetable growers grow potatoes, even if only as a matter of rotation.

As we might have expected from Mr. Oldham's previous books, he has dealt at length and to considerable purpose with the botanical features and origins of his crops. The lists of varieties and their descriptions are exceptionally comprehensive. It would be a brave as well as an erudite man who would argue with Mr. Oldham upon the historical background of our vegetables, for he knows and, we feel, really enjoys his Gerarde, his de Candolle and his Philip Miller. The extracts from these writers and others which tumble from his pen into this 1950 publication make intriguing reading. But the Guide does more than this, of course. It goes further, in all probability, than any other book of its kind in "getting over" the really essential practical details of cultivation that the grower usually has to discover by the expensive method of trial and error. It will on that account alone richly repay detailed study by the grower.

Although monoculture may be possible or indeed desirable in fruit growing, this is far from being a fact in vegetable cultivation. In most cases the successful market grower is not merely a person who knows all there is to be known about one particular crop or even several crops. The really successful grower is usually the man who can blend all his crops into a harmonious entity. There is a danger, therefore, that when a Growers' Guide takes the form of a series of separate accounts of particular crops one may miss the all important picture of overall organization. When this book runs into a second edition—an assumption which can be safely made—would it be too much to ask Mr. Oldham to add a further chapter upon general organization, upon labour and management and upon the correlation of cropping generally? To comply with this request is not easy, yet the author's experiences would be a most valuable addition.

For the same reasons the information upon horticultural machinery might well be extended. Machinery is so fundamental upon the modern holding that a critical consideration of the type available to the grower is of primary importance and it might be argued, therefore, that such information should be given pride of place. Inevitably nowadays we are having to fit our crops to suit our machinery. The appendix on irrigation is, frankly, disappointing. The importance of the subject merits more than a four-and-a-half page summary; the rotary type sprayer is not even considered, though two unexplained illustrations of this type of irrigation are given. Incidentally, one or two of the unexplained illustrations of machinery will be somewhat bewildering to those unfamiliar with them. Such points, however, do not alter the fact that this is

an invaluable addition to our literature on vegetable cultivation. As the author has stated in the Preface, "in many respects the vegetable-growing industry may be said to be commencing a new era". There is, therefore, abundant need for persons of Mr. Oldham's knowledge and wisdom to point the way ahead.

R.M.

2140. SCHØYEN, T. H., AND JØRSTAD, I.

Skadedyr og sykdommer på grønnsakvekstene. (Pests and diseases of vegetable crops.)

H. Aschehoug & Co. (W. Nygaard), Oslo, 1949, 9×6 in., pp. 142, illus. N.kr. 9.80.

Encouraged by the great success the authors had with their book on fruit pests and diseases, the Norwegian horticultural society has now sponsored a second textbook on the same lines, which is devoted to the pests and diseases of vegetable crops. Its outstanding feature—especially from the point of view of the English reader—are the 22 excellent colour plates illustrating the symptoms caused by nutritional deficiencies, pests and diseases, as well as some of the pests and pathogens themselves. The captions of these plates and of the text illustrations will be a help to any student of Norwegian horticultural literature who wants to identify the common name of a particular parasite. The book consists of three parts: I (pp. 9-104) pests and diseases grouped according to crops; II (pp. 105-27) control measures; and III (pp. 129-39) a key for the identification of pests and diseases.

V.H.G.

2141. VANSELOW, A. P., AND LIEBIG, G. F., Jr.
Spectrochemical methods.

[*Publ.*] *Calif. agric. Exp. Stat. Berkeley*, [undated, received 1950], pp. 45, bibl. 25.

In the 44 pages of this book the authors have succeeded in giving all the necessary details for the spectrochemical determination of up to 30 trace elements in plants and related materials.

The method, the result of 10 years' work, involves the vaporizing in the d-c arc of up to 20 mg. of plant ash mixed with Na_2SO_4 containing the internal standard elements Ti, Ge, Pd and Be. If the quantity of any of the trace elements present in the sample is below the limit of detection by this method, concentration is resorted to, using extraction with dithizone or precipitation as the sulphide. Line densities are measured on a A.R.L. comparator-densitometer and results obtained with the use of a graphic calculator.

Results are said to be accurate to within 10% generally and to within 20% for B and Sr and no outstanding sensitivity is claimed.

The 10 years' work can be said to have produced a realistic and straightforward routine method.

The authors have been surprisingly successful in their method of purifying the graphite electrodes. After extracting for several days with HCl and then HNO_3 , the electrodes are repeatedly rinsed in water re-distilled from all-Pyrex glass stills and are only occasionally found to contain Si and Ti. It is remarkable that this simple purification method produces electrodes free from B. This work, as the authors suggest, should be of particular interest to beginners in the field of plant nutrition.

F.H.V.

2142. WESTON, W. A. R. D.

Diseases of potatoes, sugar beet and legumes.

Longmans, Green & Co., London, 1948,

8½ × 5½ in., pp. 86, illus., 4s.

Dr. W. A. R. Dillon Weston, formerly Advisory Plant Pathologist at the School of Agriculture, Cambridge, has, in recent years, written a series of articles in *Agriculture*, the official journal of the Ministry of Agriculture, in concise language easily understood by the practical grower, giving information on the life history of organisms causing important diseases of crop plants, with accounts of control measures. Drawings (by Ann Murray) showing life histories were a familiar and attractive feature of those articles, some of which have been revised by the author to form (with their illustrations) the present book, which comprises the history and present-day treatment of potato blight, curl and dry rot, gappy crops, eelworms, foliage diseases such as downy mildew, root diseases and clover sickness. The symptoms of each disease are described in sufficient detail to aid recognition, and control measures are set out clearly. The first two chapters contain copies of letters which are of particular interest as showing the attitude of certain observers to the outbreaks of potato blight in the early years of its appearance in the British Isles. Farmers following the advice set out in this cheap and handy book should be able more easily to reduce losses in their field crops.

H.W.

2143. WHYTE, R. O., AND SISAM, J. W. B.

The establishment of vegetation on industrial waste land.

Joint Publ. Commw. Burx Pastures and Field Crops, and Forestry, 1949, 8½ × 5½ in., pp. 78, illus., bibl. 83, 10s.

Among the species noted with approval for use in covering old slag or other waste heaps are many plants well known to horticulturists including shrubs such as *Forsythia*, *Buddleia*, *Leptospermum* and *Mesembryanthemum* spp. and many others.

It is to be hoped that the perusal of this bulletin may lead to firm measures being taken to change unpleasant disfigurements of the countryside into pleasant and, in many cases, economically productive areas. D.A.

2144. AMERICAN POMOLOGICAL SOCIETY.

Proceedings of the Sixty-third Convention of the American Pomological Society in joint session with Washington State Horticultural Association, Yakima, Wash., Dec. 1948, 1949, pp. 218.

The Proceedings contain not only articles separately abstracted [elsewhere in this number] but also a collection of articles on marketing problems, one on the new insecticides, their limitations, hazards to health, one on the evaluation of aeroplane applications of insecticides, three on the peach industry and its problems and a short note on the centenary of the American Pomological Society, its history, accomplishments and objectives.

2145. BALSÅRD (GRANHALL, I.).

Föreningen för växtförädlad av fruktträd verksamhetsåret 1948. (A.R. of the Swedish Association for Fruit Tree Breeding, Balsgård, for 1948), 1949, pp. 30.

A 5-page account is given of the breeding work, mainly on fruit and vegetables, which is being carried out at Balsgård. Its progress is discussed from time to time in scientific journals.

2146. BARBADOS.

Annual Report, Department of Science and Agriculture, Barbados, 1948-49, Bridgetown, pp. 99.

Amongst activities reported on are the following: *Sugar cane breeding*: Tabulated details are given of crosses made and seedlings produced. In first ratoon trials 4 seedlings of the B.46' series showed promise. Performance of the better seedlings of the B.45' and B.44' series was variable but not outstanding. Amongst earlier selections B.41211 has yielded well under all conditions so far tested, B.41227 and B.43391 in high and intermediate rainfall areas, and B.43337 in low and intermediate rainfall areas. *Mosaic disease*: In inoculation trials a new suction technique, and the Sein method both gave only about 10% "take"; this is thought to be due to loss of virulence of the mosaic disease strain in the isolation plot. *Manurial trials on cane*: Results of 3 trials repeated in 1 to 3 areas on plant canes and ratoons are tabulated. Sulphate of ammonia gave significant increases in yield in some cases and not others, but in most cases significantly reduced the percentage sucrose. *Phosphate content of cane juices*: In nearly every case samples from 7 trials showed higher P₂O₅ in the juice from plots receiving K only than from plots receiving N only, thus indicating an antagonism in nutrient uptake between N and P. Varietal differences may also be indicated, B.41211 juices showing much lower P₂O₅ than B.37161 juices. *Vegetable nutrition*: Investigations are being made into possible trace element deficiencies in vegetables grown on coral limestone soils. *Entomology*: Various pests are mentioned, notably *Diatraea saccharalis*, the small moth borer of cane, for which several parasites have been released, and *Diaprepes abbreviatus*, the cane root borer, which is on the increase.

2147. "DE PROEFTUIN" TE BOSKOOP.

Jaarboek uitgegeven door de vereniging "De Proeftuin" te Boskoop, 1945 and 1947. (Yearbook of the Society "De Proeftuin" [The Trial Garden], Boskoop, 1945 and 1947), pp. 59 and 61 [received 1950; for Yearbook for 1948, see H.A., 19: 3547].

The report for 1945 contains brief accounts of the following work: identification of a leafspot disease of *Daphne mezereum* as a virus; experiments on the effect of rooting media and fungicides on the spread of *Rhizoctonia solani* in young clematis grafts; an unsuccessful attempt to force Japanese azaleas by short day treatment; rootstock trials for roses; and extensive trials with growth substances, rooting media, etc., for the propagation of ornamental shrubs, trees and apple rootstocks by cuttings.

The 1947 report gives results of fertilizer trials with the Boskoop *Rosa rugosa*, of experiments on the effect of growth substances and ethylene chlorhydrin on the take of rhododendron grafts, and of weed control experiments with 2,4-D and DNC in ornamental shrubs. Further work is reported on the propagation of ornamentals by cuttings.

2148. BRITISH COLUMBIA.

Forty-fourth Annual Report of the Department of Agriculture, B.C., 1949, 1950, pp. 239.

The following work is reported from the Horticultural Branch (pp. 58-83): greenhouse tomato trials with the new mould-resistant varieties V473, V4802 and V4803; the resistance of strawberry varieties to red stele, and the effect of ridge planting in reducing infection; the use of aero-cyanate and cyanamide as selective weed-killers on onion seedbeds; sweet corn variety trials; observations on the use of sawdust as a mulching material for soft fruit and outdoor chrysanthemums; tests of fungicides for apple scab control; tests of various materials and strengths of application for blossom thinning of apples, apricots and prunes; experiments on the control of woolly aphis on apples, *Coryneum* blight on apricots and peaches, San José scale on prunes, and mice in orchards, and on the treatment of zinc deficiency by a zinc sulphate spray. [The value of this last experiment would be considerably increased, if the test plant were specified.]

2149. CANADA, DEPARTMENT OF AGRICULTURE.
Progress Report Division of Illustration Stations, Central Experiment Farm, Ottawa, 1938-1947, 1950, pp. 85, illus.

The work of the Illustration Stations includes the dissemination of information, the testing of crops and varieties in various districts and studies of local cultural problems. Most of this report is concerned with agricultural problems, but the following items will give an indication of the range of horticultural work carried out. *Potatoes*: studies of fertilizer, crop sequence and green manure crop effects in the specialized potato areas are reported. *Hop studies at Fournier, Ont.*: Fertilizer trials indicated that the most suitable formula for chemical fertilizers on local sandy loam was 4-8-10. Increasing rates of application up to 1,000 lb. per acre gave progressively greater yields. Trellis training resulted in higher yields per acre and longer life of the hop vine than pole training. Investigations were carried out on the control of hop vine borer and downy mildew. *Cranberries*: In weed control studies on Prince Edward Island, ammonium sulphamate used as a spray or dust at 320 lb. per acre proved useful in destroying moss, grasses and scrub bushes. Growth of grasses, weeds and ferns was retarded by spring applications of 1,600 lb. of coarse salt per acre. The best control of cranberry fruit worm was obtained by dusting with 15 lb. cryolite in combination with 35 lb. pulverized gypsum per acre when two-thirds of the blossom had fallen, followed by a second application 11 days later. *Tomatoes*: Experimental work on the maintenance of soil fertility, methods of transplanting, varietal comparisons and irrigation practices is reported from Osoyoos, B.C.

2150. CANADA.

Report of the Minister of Agriculture, Dominion of Canada for the year ended March 31, 1949, 1949, pp. 260, 50 cents.

Among horticultural activities covered are the following: *Botany*: Weed survey, effects of herbicidal oils on the physiology of umbelliferous crops and

* Pages 111-90, Dominion Experimental Farms 1948-49, are also published separately.

weeds, effect of bordeaux mixture on the physiology of potato plants. *Mycology*: Plant disease survey, diseases of fruits, potatoes, vegetables, and ornamental plants. *Plant chemistry*: Tissue analysis, a new polarographic method of determining zinc, ascorbic acid content of tomato juice, minor element deficiencies in fruit trees, insecticides and fungicides including the efficiency of high-speed sprayers. *Entomology*: Fruit insects and their control. *Horticulture*: Apple rootstocks, fruit thinning by chemicals, winter injury, blueberry and cranberry culture, breeding of apples, black currants and strawberries, orchard fertility, the production of vegetable foundation seed, pea and potato breeding, the use of pelleted vegetable seed, and investigations in floriculture. Work has also been undertaken on freezing preservation, fruit juices, canning and frozen fruit desserts, and on the packaging of peaches, apple harvesting dates and the air duct design and air distribution of cold stores. *Illustration Stations*: Production studies on tobacco and cranberries. *Tobacco*: Varieties and seed production, soil management including manuring and transplanting, rotations and flue curing. *Chemical weed control*: In field crops and fibre flax, and the control of hoary cress.

2151. CENTRE DE RECHERCHES DE LA LIGUE POMOLOGIQUE POUR LA DÉFENSE DU FRUIT BELGE.

Rapp. génér. Centr. Rech. Ligue pomol. Déf. Fruit belge pour les années 1947 et 1948. (General report of the Belgian Fruit League for the years 1947 and 1948), pp. 172.

The work reported here falls into 2 related sections. (1) *Methods of manuring fruit trees*: A study was made of the method of applying fertilizers in solution by injecting the subsoil. As a result of this study recommendations are made concerning the most suitable fertilizers to use, methods of making up the solutions, and the technique of injection. A simple and effective injector lance is described. It is claimed that this method may be applied easily and with advantage on a commercial scale, and is especially valuable in grass orchards. In 1947 and 1948 field trials were carried out in 8 orchards to compare the effect of surface applications of dry fertilizers with that of injection of liquid fertilizers. The results were inconclusive. (2) *Methods of determining the nutrient requirements of fruit trees*: Leaf analysis was found to be a much more satisfactory method of diagnosis than soil analysis. Techniques for sampling and analysis of leaves and shoots were investigated and those found most rapid and accurate are described. Results of foliar analysis of the 8 experimental orchards are tabulated and interpreted. The method of fertilizer application appeared to have little effect on the mineral content of the leaves.

2152. CYPRUS (CHAMBERS, P. C.).

Annual Report, Department of Agriculture, Cyprus, 1949.

Cyprus Govt. Printing Office, Nicosia, 1950, pp. 16, 2s.

A brief summary of experimental work includes mention of: *Manurial trials*: In the third year of a manurial trial with vines, N increased yield and K

sugar content. In the first year of two new trials with vines there was no response to fertilizer, and trials with olives and citrus also gave negative results. *Chemical investigations*: Determinations of NPK in olive leaves showed levels of nutrition to be generally adequate; N was generally highest in the autumn in irrigated trees and in the spring in unirrigated; P and K were highest in the summer. Fe deficiency, due possibly to genetical factors, were again found in oil content of the local olive variety "Ladolia"; the imported variety "Shemlali" did not appear to be superior. *Weed control*: 2,4-D appeared to be more effective against local weed flora than MCPA. *Entomological investigations*: In one small trial DDT and BHC controlled the vine bud moth, *Theresimima ampelophaga*. It is noted that more detailed accounts of experiments can be found in individual stencilled reports obtainable from the Director of Agriculture, Nicosia.

2153. DANSK GARTNERFORENING (DANVIG, A. M., AND PEDERSEN, K.).
Årbog for Gartneri 1949. (Horticultural Yearbook 1949.)
S. L. Møllers Bogtrykkeri, Copenhagen, 1950, Vol. 31, pp. 261, Kr. 3.

The general layout of the Yearbook is similar to that of previous editions [see H.A., 19: 1670]. Further trials with two tulip varieties at Voldby show that a storage temperature of 21° C. (from 19 July to 30 August) favours the production of large-sized bulbs for forcing, while temperatures of 25° and 28° C. are conducive to the formation of a greater number of small-sized bulbs. Data are presented from eight manual experiments with tulips and of two with narcissus, the chief conclusion from which is that nitrogen should preferably be applied to tulips (a) in the autumn and (b) in organic form. Tulips and narcissi were benefited by applications of manganese, and narcissi growing in a sandy soil by an application of nitrogen. The Yearbook contains the 10th report of the Danish Committee for variety trials of ornamental plants, dealing with antirrhinum, chrysanthemum, dahlia and iris, and the 30th report* of the Committee for variety trials of vegetables, dealing with late cauliflower, kale, brussels sprouts, radish, red cabbage and lettuce. Tomato and cucumber varieties are also discussed.

2154. DOMINICA.
Annual Report of the Department of Agriculture Dominica for 1947.

Roseau, Dominica, pp. 33 [received 1950].

Appendix 3 summarizing investigational work contains the following information: *Sugar cane*: Both in plant and first ratoon crops B37161 and B3439 significantly outyielded B35187, B35245 and BH10/12. Further varieties are under trial. *Tobacco*: Attempts to grow a crop out of season failed. *Manila hemp*: Results from trials in 9 areas indicate that ecological conditions in Dominica do not suit the cultivation of this crop. *Vanilla*: A manual trial with Ca, P and K has been started to determine effects on yield and incidence of root disease (*Fusarium batatis* var. *vanillae*). Elsewhere

in the report mention is made of food crop varieties, limes, dwarf coconuts and proposals for the extension of cacao cultivation.

2155. HANSEN, L.
27. *Beretning fra Faellesudvalget for Prøvedyrkning af Køkkenurter. 28. Beretning fra Faellesudvalget for Prøvedyrkning af Køkkenurter. (27th and 28th Report* of the Danish Committee for vegetable variety trials.)*
Reprinted from *Aarbog for Gartneri*, 1947 and 1948, Copenhagen, 1947 and 1948, pp. 192-221 and pp. 185-243 respectively.

The 27th report deals with varieties of winter cabbage for storage and of scorzonera, the 28th with varieties of early cauliflower, round beetroot, spinach under glass, summer carrot and parsnip.

2156. HONG KONG.
Report of the Agricultural Department, Hong Kong, for 1948-49, 1949, pp. 18 plus crop record tables pp. 31.

The vegetable variety trials at the Sheung Shui Agricultural Station, referred to in the previous report (H.A., 19: 3561), have been continued, and full information is tabulated on dates of sowing, transplanting and harvesting, manures used and yields obtained. The vegetables under trial are tomatoes, cabbage, cauliflower, broccoli, lettuce, sprouts, carrots, spinach, peas (pole and dwarf), beetroot, sweet pepper, sweet corn, celery, Swiss chard, French beans, onions, Chinese kale, leaf mustard, Chinese string beans, lotus, yam beans, and sweet potatoes. The thorough yet simple manner in which these trials are reported should be of great help to local vegetable growers, and over a period of years should greatly increase the knowledge of vegetable behaviour in Hong Kong. [The report as a whole is unusually well printed, and the manner in which administrative details are rigidly separated from experimental reports is one which could be followed with advantage by other agricultural departments.]

2157. I.N.E.A.C.
Rapport annuel pour l'exercice 1948 I.N.E.A.C. (Report of work of I.N.E.A.C. stations 1948.)
Institut national pour l'étude agronomique du Congo belge, Brussels, 1949, pp. 290, 150 fr.

The following items are taken from reports of the central research station, Yangambi, and various sub-stations: *Oil palms*: Breeding and selection work includes studies on the inheritance of the character "albescens" and on *E. melanococca*. Cultural experiments include spacing, intercropping, fertilizer, and mulching trials, and trials to determine methods of replanting old plantations of palms. *Rubber*: Selection work includes a trial on pre-selection based on the vigour of seedlings, in which vigorous plants have been found to maintain their initial advantage, but with no correlation between growth and yield in the early stages. Additional mother trees have been selected and propagated vegetatively. Production from earlier selections is tabulated. A spacing and thinning trial has so far indicated no adverse effect on the yields of

* For 27th, 28th and 29th reports see H.A. 20: 2155 and 19: 1670.

* For 29th and 30th reports see H.A. 19: 1670 and 20: 2153.

individual trees from close spacing. Experiments are also reported on the effects of double-working with special reference to brittleness, on pruning, on inter-planting with bananas and on the control of diseases. *Coffee*: Introduced material used in breeding includes *C. canephora*, *C. congensis* and interspecific "Congusta" hybrids, which are being multiplied vegetatively. Selection and multiplication of clones continues. Cultural experiments include a trial in which robusta coffee was established in forest land treated in different ways, trials of multiple and single stem pruning and shade tree experiments. *Cacao*: Owing to the risk of introducing diseases all imports of plant material have ceased. Individual tree records are being kept on the pure line descendants of "Mobwasa" lines established in 1924, and a comparative study is in progress on hybrid seedlings of Forastero and Criollo mother trees. Cultural experiments include comparisons of trees established with shade trees in burnt and non-burnt forest land and in thinned forest, and different spacings. *Food crops*: Yams are the subject of variety trials and experiments on size of planting material, mixed cultivation and rotations. With cassava, work is in progress on hybridization, selection, grafting, and HCN content. Sweet potato varieties are being compared and crossed. *Fruits*: With bananas, breeding work has just been started, and records on indigenous types have been analysed; trials are reported on the use of organic manures, cultivation methods, cover-cropping and mulching. A large number of native and introduced fruit trees are being studied and methods of vegetative propagation worked out, notably for *Artocarpus*, *Nephelium* and *Citrus* spp. *Fibres*: Experiments are reported on sisal and *Urena lobata*. Species of *Abroma*, *Boehmeria*, *Sida*, *Cochorus*, *Hibiscus* and *Crotalaria* are under observation. *Other crops* mentioned as subjects of experiments include pineapples, tung oil, pyrethrum and haricot beans.

2158. I.F.A.C.

Rapport annuel, Institut des Fruits et Agrumes coloniaux, 1948. (Annual Report, I.F.A.C., 1948.)

7 Rue Saint-Dominique, Paris, pp. 119, illus. [received 1950].

The I.F.A.C. was founded in 1942, and having now completed the establishment of a number of research stations in the French Colonies presents its first annual report. The first section of the report is devoted to the organization set up in metropolitan France and includes descriptions of work in progress by the divisions of agronomy, entomology, technology and economics. The second and largest section of the report is devoted to accounts of work at the research stations in Africa and the Antilles (West Indies), from which the following notes are taken: *Station centrale des cultures fruitières, Foulaya, Guinea*: Layout of the station and its soils are described. Experiments in progress there and at substations include: *Bananas*, uniformity trial, mulching, drainage, spacing, irrigation, time of planting, cover crops, and time taken by fruit bunches to mature; a variety collection of 74 types has also been established. *Citrus*, preparation of planting holes by means of explosives. *Pineapples*, use of hormones in planting suckers, spacing. *Soil improvement*,

cover crops and mulch crops. *Plant protection*, methods of controlling banana and citrus pests (*Zonocerus variegatus* and *Cosmopolites sordidus*) and work on various insecticides. *Station régionale d'Azaguié, Côte d'Ivoire*: Progress so far has been limited to the appointment of a phytopathologist who is studying leaf spot disease of bananas. *Station régionale de Nyombé, Cameroon*: The layout of this station established in 1946 is described. Notes are supplied on collections of bananas, cover crop plants, pineapples, and other fruits. Experiments on both Gros Michel and China bananas include dates of planting and pruning (desuckering) in relation to spacing. Studies on the behaviour of the "Brazil" pineapple and certain abnormalities have been started. *Section des Antilles*: Efforts are being made to co-ordinate fruit research work in the West Indian islands and to select a site for a station. *Mission to Morocco*: The collection of citrus plants has been undertaken and certain varieties studied. Research into the origin of the hybrid Clementine orange is in progress. *Miscellaneous*: Among appendixes is a botanical list of the different species and varieties of fruit plants so far collected on the stations.

2159. JAMAICA.

Annual Report, Department of Agriculture, Jamaica, 1946-7, 1949, pp. 30, 1s. 3d. [received 1950].

Amongst a wide range of activities reported briefly are the following: *Bananas*: Breeding work, variety trials with up to 25 seedling varieties, manurial, mulching and spacing trials, and cold storage trials with possible substitutes for the Gros Michel. *Citrus*: Spraying with naphthaleneacetic acid against pre-harvest drop, oil sprays as herbicides, analysis of leaves to determine nutrient status, and three major manurial trials. *Coconuts*: Spacing and cultural experiments; application of manganese proved ineffective against the "unknown" disease. *Avocados*: Shipping trials with 8 varieties. *Mangoes*: Rootstock trial. *Naseberry* (sapodilla): Selection of varieties and propagation by patch budding. *Mulberries*: Propagation of Osigan mulberry by cuttings and layering. *Cashew*: Transplanting technique developed. *Miscellaneous fruits*: Amongst many introductions mention is made of Winter Nelis pear budded on loquat. *Fibres*: Manila hemp clones, *Arundo donax*, *Raphia pedunculata* and two *Sansevieria* species have been planted; *Urena lobata*, ramie and sunnhemp have given unsatisfactory fibre yields. *Other crops*: Mention is made of several insecticidal, essential oil and condiment crops, bamboo species, vegetables and cover crops.

2160. JAMAICA.

Annual Report, Department of Agriculture, Jamaica, 1947-8, 1950, pp. 23, 1s. 3d.

Despite difficulties arising from drought, staff shortages, increasing labour costs and praedial larceny of experimental material, most of the work reviewed in the previous report [see abstract 2159 above] was continued and in some cases extended. Only changes in programmes and new results are therefore mentioned here. *Bananas*: A fifth variety trial at high elevation was planted. Cold storage and ripening trials showed no new varieties to be comparable in eating quality with Gros Michel and Lacatan, though two Pisang Lilan

crosses had outstandingly good pulp texture and one of them gave the highest yields of marketable fruit. *Citrus*: Leaf analyses have indicated a general deficiency of N and in some areas also of K, and there is also evidence that deficiencies of Mg, Zn and Mn are widespread. Spraying with two concentrations of 2,4-D did not delay fruit drop in one trial. *Coconuts*: Soil fumigation and trace element experiments are reported in connexion with the "unknown" disease, but so far with no result; no correlation was found between rate of death and low Mn content of leaves. *Avocado*: A successful bare-root transplanting technique was developed. *Breadfruit*: Propagation experiments. *Pears*: Winter Nelis pears budded on loquat failed to leaf out properly.

2161. KENTUCKY.

Sixty-first Annual Report Kentucky Agricultural Experiment Station 1948 [received 1950], pp. 80.

This report includes short accounts of the following work: weed control in tobacco plant-beds with methyl bromide; control of wireworm injury to newly set tobacco plants; manuring, time of cutting and priming experiments with burley tobacco; determinations of growth and mineral composition of burley tobacco grown in different parts of the State; variety trials with tomatoes, sweet corn, potatoes, peaches, strawberries and black raspberries; experiments on the effect of low-level radioactive materials on growth of tomatoes; bean beetle control with 50% methoxychlor; experiments on the use of allyl alcohol for weed control in gardens; peach pruning trials; and control of strawberry weevil with chlordane. The report from the Western Kentucky substation contains accounts of tobacco fertilizer experiments and the results of fruit variety trials.

2162. MAURITIUS.

Annual Report Mauritius Department of Agriculture, 1948, 1949, pp. 80, Rupee 1.

Apart from sugar cane research, for which see H.A., 19: 3572, the following are among the activities reported briefly in a series of appendixes: *Fibre*: The incidence of poling in *Furcraea*, determined in several places, was highest in plants exposed to full sunlight. *Yams*: Ten varieties showed marked differences in yields. *Plant propagation*: As a result of trials the following methods have been adopted as standard practice: (1) For avocados side-grafting, (2) lichi layering, (3) peach crown-grafting, (4) mangoes inarching, because no satisfactory alternative has yet been discovered; trials are still in progress, (5) bougainvillea; trials with hortomone A to improve the low strike of cuttings of 4 varieties have been unsuccessful except for a slight response in the variety Mrs. Butt. *Tobacco*: Trials are reported with NPK at 3 levels, N at 2 levels with 3 varieties, application of CuSO_4 , strains of Amarello pointed leaf, progeny plots, hybrids, and the resistance of varieties and hybrids to black shank. Sugar contents of leaves from plants receiving 2 levels of NPK were also determined. *Weed control*: Of the leaf-eating beetles imported to control black sage, *Cordia macrostachya*, one has failed, but another, *Schematiza cordiae* from Trinidad, is well established. *Plant pathology*: Investigations are reported on tobacco leaf curl, banana diseases and wilts of *Casuarina*

and royal palm. *Miscellaneous*: Brief reference is made to potatoes, tung, tomatoes, derris, pyrethrum and vegetable seed production.

2163. MORDEN (LESLIE, W. R.).

Progress Report Dominion Experimental Station Morden, Man. 1938-1946, 1949, pp. 87.

Horticulture is the first major division of the Morden Station, which was established as a branch station of the Dominion Experimental Farms system in 1914 to specialize in prairie horticulture.

The meteorological records from 1919 to 1946 show that during that period the latest spring frost occurred on 7 June, 1924, the earliest autumn frost on 2 September, 1946, that the average frost-free period is 124 days, the average rainfall 20 inches (12.29 in. in May to September inclusive), the highest temperature recorded was 111.2° F. (in July) and the lowest -40° F. in January.

The present report is mainly concerned in recording briefly the characters of the fruits, vegetables and ornamentals which, as the result of selection and breeding, can now be recommended for prairie conditions. The fruits include apples, apricots, plums and sand cherry plum hybrids, grapes, actinidia, sweetberry honeysuckle (*Lonicera villosa*), pincherries, nuts (native hazels, Manchurian filbert, black walnut, butternut \times Manchurian walnut), strawberries (including ever-bearing varieties), raspberries, red, black, and white currants, and gooseberries.

The problem of the production of hardy rootstocks is considered second only in importance to that of fruit breeding. Of apples and crabs the most effective rootstocks are the seedlings obtained from Saunder's first cross crab-apples, seedlings of Columbia, Osman and Bedford being preferred. *Malus manchurica* and *M. baccata* seedlings are discussed. Tests with *Malus robusta* No. 5 from Ottawa are in progress. The Mallings stocks are not sufficiently hardy. Rootstocks for plums discussed include sandcherry seedlings (not satisfactory), native plum seedlings (also with disadvantages) and *Prunus americana*, e.g. Wastesia and Zekanta (the most satisfactory, though tending to form suckers).

As regards stocks for cherries, mazzard and mahaleb are widely used but tend to die in hard winters. Others are under examination. For apricots some form of hardy apricot stock is the best; three types are available, viz. seedlings of *Prunus sibirica*, *P. manchurica* and hardy hybrids. For pears, seedlings of *Pyrus ussuriensis* and *P. avoidea* are moderately satisfactory. Quince (Angers type A) was winter killed. In double working trials Columbia, Beauty, Bedford, Osman, Prince, Alberta and Virginia apples have shown promise as intermediates for certain varieties. Notes are given of pollination problems and of pest and disease control with indications of fire blight resistance shown by different apple and pear varieties. Vegetable varieties recommended are also listed. Some 12 pages are devoted to woody ornamentals including vines and creepers, roses, shrubs giving shelter and food for birds, and hedges. A short note is given on the Fruit Products Laboratory set up in 1945. It has facilities for work on cold storage, quick freezing, canning and juice production.

2164. MUSHROOM RESEARCH ASSOCIATION LTD.,
YAXLEY.

Report of the Mushroom Research Station, Yaxley, Peterborough, for the year 1949, 1950, pp. 56, illus., 5s.

This report is presented in 3 sections. *Cropping experiments*: Three experiments are described. (1) The effect of adding nutrients to compost: neither increased N nor the addition of ground chalk increased the yield; the use of superphosphate was not effective until the fourth turn. (2) Soluble hide meal was not equal to dried blood as a source of N. (3) No appreciable difference was found in yields from compost made for 3 to 5 weeks, but those stacked for 5-6 weeks gave more consistent results. *Chemistry Department*: Previous work on sampling and analysis of compost was continued and correlations between dry matter losses during cropping and yields were investigated. *Microbiological Department*: Observations were made on the occurrence and severity of attack of fungal invaders and competitors; growth rate and infection experiments were conducted. In addition, directions are given for making M.R.A. compost, the use of calor gas for peak heating is considered, compost costings are discussed, and the use of indicator paper for pH testing of compost and soils is explained.

2165. NAALDWIJK.

Jaarverslag van de proeftuin "Zuid-Hollandsch Glasdistrict" te Naaldwijk 1948. (Annual Report of the South Holland Glass District Experimental Garden, Naaldwijk, 1948), pp. 60 [received 1950].

Jaarverslag van de Proefstation voor de Groenten en Fruiteelt onder Glas te Naaldwijk, 1949. (Annual Report of Research Station for Fruit and Vegetable Culture under Glass, Naaldwijk, 1949), pp. 63.

Attention is drawn to the new title of this research station. The annual report, however, is drawn up on the same lines as before, the 1949 report summarizing the following work: fertilizer trials with grapes, peaches, tomatoes, strawberries and cucumbers; variety, planting time and soil-warming trials with gladioli and ixijs; rootstock trials for melons; experiments in the use of artificial lighting for tomatoes, cucumbers, chrysanthemums, ixijs and gladioli; cultural trials with Muscat grapes; and experiments in the use of growth substances for inducing fruit set in tomatoes, melons, peppers and fruits. Progress in the breeding and selection of fruit and vegetable varieties and the results of numerous trials in pest and disease control are reported.

2166. NATIONAL SHADE TREE CONFERENCE.

Combined Proceedings of the 27th National Shade Tree Conference, Baltimore, Md., and 16th Western Chapter National Shade Tree Conference, Sacramento, Calif., 1949, pp. 381, illus.

Among numerous papers mainly on the propagation, care, pests and diseases of shade trees, the following are of special interest. *Spray fertilization of fruit trees* (pp. 6-15) is a review of the commercial uses and methods of applying trace elements and urea to fruit trees in the form of foliage sprays. Early spring sprays of urea may be beneficial to apple trees on heavy

soils in years of excessive spring rainfall. There is a useful table giving the form, concentration, number of sprays, time of spraying and possible commercial use of 8 nutrients used experimentally on apple trees. *The prevention of fruit formation on some ornamental trees* (pp. 88-100): Some 25 spray materials were tested for the prevention of fruiting on ornamental trees at the Ohio State University, Columbus. The materials and methods of application that gave the best results on Norway maple, horse chestnut, tree of heaven, ailanthus, northern catalpa, European ash, ginkgo, thornless honeylocust, Kentucky coffeetree, American sweetgum, purple crabapple, red and white mulberry, London planetree and eastern poplar are recorded.

2167. CONGRÈS NATIONALE DE LA PRUNE.

Le 2e Congrès National de la Prune et du Pruneau, Agen, 1948. (The 2nd Plum and Prune Congress, Agen, 1948.) Bordeaux et le Sud-Ouest, 1949, Vol. 30, No. 1 (Agen et sa région), pp. 31-161, illus.

Papers presented to this Congress are of both general and scientific interest, and give a clear insight into the achievements and problems of the plum and prune producing industry of France. A section containing articles on the importance of the industry in the various districts of France is followed by sections on the technique of production (including articles on rootstocks, manuring and varieties), control of pests and diseases, commercial aspects of production (including packing, marketing and storage) and finally a section on methods of drying and how they might be improved. The more important papers are abstracted separately.

2168. PYRETHRUM BOARD OF KENYA.

A.R. Pyrethrum Board of Kenya for 1949, 1950, pp. 25.

The report includes brief mention (pp. 4-7) of plant breeding, bud disease, recommendations on types of drier, reduced transit losses, the florax process (packing of separated achenes), a new wet extraction method, and grading by chemical analysis.

2169. SARAWAK.

Annual Report of Sarawak Department of Agriculture for 1948, Kuching, 1949, pp. 29+appendixes 35 pp. +1 map.

The work of the Department of Agriculture, limited in scope by shortage of trained staff, has so far been concerned mainly with soil and crop surveys, general observations, and with the distribution, often under considerable difficulties, of improved planting material. Apart from rice, crops mentioned include rubber, sago, coconuts, pepper, derris, pineapples and tobacco. Observation plots on oil palms, manila hemp and cocoa suggest that these crops might succeed on the rather limited areas of good soil in the territory. Trials with small power-driven machines are mentioned, including the successful use of rotary hoes in the cultivation of tree and shrub crops and the eradication ofalang weed [*Imperata arundinacea*] during dry weather.

2170. "THE TIMES."

Survey of gardening in Britain. The Times Publishing Co., Printing House Square, London, E.C.4, March 1950, pp. 16, 4½d. post free.

This will appeal particularly to the English amateur

gardener, who has money to spend wisely, but mainly for the delight of the eye. Vegetables are dismissed in less than half a page and fruits in the same space. Attractive advertisements take up 4 pages and the rest is devoted to articles by experts on the following, among other, subjects: *Primula* species and their hybrids; plant hormones; cultivation and choice of annuals; labour-saving devices; the town dweller's garden; cool-house orchids; alpinists; and pests of ornamentals.

2171. TRELAWNEY.

Annual Report Trelawney Tobacco Research Station for 1948, being *Publ. Tobacco Research Board S. Rhodesia*, 12, 1949, pp. 111.

Fertilizers: Previous trials have shown the optimum fertilizer range for grey sand soils at Trelawney to be N 27 to 36 lb. per acre, P 9 to 40 lb. and K 10 to 48 lb. A trial is reported in which larger amounts of P and K were used, in line with American recommendations, but no advantage resulted. **Spacing:** Results from trials on grey sand soil are tabulated for 3 previous years. They show that reduction of spacing to 3 ft. 6 in. \times 2 ft. gave a worthwhile improvement in yield and value, but that with further reduction to 3 ft. \times 2 ft. the yield increase was too slight to compensate for heavier costs. In 1947-48 a similar trial on slightly heavier pink sand soil showed that spacing on this soil could be reduced with advantage to 3 ft. \times 1 ft. 6 in. **Crop rotations:** Results of trials carried out between 1936 and 1947 are summarized. A further year's records from a 5-course rotation trial confirm the value of Rhodes grass and dahl and the detrimental effect of sunnhemp when preceding tobacco on light grey sand soils. However, in trials on relatively heavy soil the position has been largely reversed. **Compost trials:** Results from experiments carried out between 1939 and 1947 are summarized and 4 trials made in 1947-48 are reported. (1) Residual effects of 5 different composts applied to the preceding crop were variable but gave an average yield increase of 11% compared with 22% in the year of application. (2) An "Adco" compost made without animal waste gave as good results as 2 composts made with animal waste. (3) On aging land of grey sand type, compost produced large yield increases, and the older the land the greater the effect. (4) Compost applied to land carrying different crop rotations significantly increased yields in some cases but not others. **Interplanting legumes and tobacco:** In a single trial there was no evidence that cow peas or soya beans increased the supply of N to neighbouring tobacco plants. **Cyanamide in seedbeds:** Used to control weeds in seedbeds cyanamide was less effective than the standard practice of burning, owing to its failure to kill rapoko grass. It also had no effect on the root knot nematode. **Variety trials:** Results from 5 trials are reported. **The use of gammexane to control white grub and false wireworms:** A 1946-47 trial is discussed, and three trials in 1947-48 are described in which early and late applications and methods of application were compared. Gammexane has proved very effective for the control of white grubs and wireworms, though not crickets; it may be applied just before planting or several weeks earlier and is effective either broadcast or as local dressings around

the plants. **Curing:** Comparative costs of 5 types of fuel ranged from 0.57d. to 5.75d. per lb. of leaf dry weight. [See also *H.A.*, 19: 3249.]

2172. WÄDENSWIL (KOBEL, F.).

Jahresbericht 1946-1948 der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil. (Annual Report of the Wädenswil horticultural research station for 1946-48.)

Landw. Jb. Schweiz, 1950, 64: 69-122.

Breeding. Fruit: Six seedlings of the very numerous apple crosses which came into bearing were selected for extensive trials. [The latest strawberry variety of the Wädenswil series, Wädenswil 4 [see *H.A.*, 18: 2504], has been a success with the canning industry, as it is easily picked without calyx. Vegetables: The dwarf bean variety Wädenswil has been released. Good results are also reported on the breeding work with onions, cabbage, fennel and tomatoes. Flowers: A new *Primula malacoides* variety has been produced and several new hydrangea varieties have become popular with the trade. Hydrangea breeding continues. **Physiology.** Storage trials with apples confirmed earlier results that moist moss absorbs only a very small portion of the ethylene produced. The use of methyl bromide for fruit tree fumigation against San José scale was found impracticable in view of the narrow margin between a concentration that kills the pest and one that injures the plant. Other work concerned the quick freezing of apricots and the rooting of cuttings from fruit trees and ornamentals. **Plant protection.** Much time was devoted to the analysis of proprietary fungicides, insecticides and herbicides. Field trials showed that apple mildew can be controlled by wettable sulphur preparations, if two pre-blossom treatments are applied and a spreader is added. Pruning should be combined with spraying, however, if really satisfactory results are to be obtained. Cuprous oxide proved as good as copper oxychloride or bordeaux mixture for the control of shot hole of cherry (*Clasterosporium carpophilum*). There was a severe outbreak of *Cylindrosporium* disease of cherries in 1948. Thiuram and hydroxyquinoline compounds checked *Botrytis* rot of vine but favoured the spread of green mould (*Penicillium* sp.). Winter washes for San José scale control are being tested on a very large scale, in conjunction with the horticultural research station at Lausanne. Winter washes in general continue to be tested against winter moth and apple aphid eggs. Benzene hexachloride applied towards the end of the blossoming period proved superior to DDT emulsions for the control of plum sawfly. Parathion gave promising results against this and various other pests, including cabbage aphid. The copper content of the spray residue on leaves exposed to artificial rain was determined, and the reduction was found to vary from 0 to 60% according to the preparation used. In extensive trials with damping off in vegetables the fungi *Rhizoctonia solani* and *Moniliopsis aderholdii* showed little specialization. The best control lies in the sterilization of the soil by heat, as antagonistic soil fungi have no more than a moderating effect. High concentrations of hydroxyquinoline were incapable of killing sclerotia of *Botrytis cinerea* in the soil, whereas formalin proved sufficiently toxic for the purpose. Whereas at 20°C., 100g. of apple

tissue was found to give off 2-3 mg. CO₂ per hour, respiration was stimulated 6-fold in fruit infected with *Monilia fructigena*. More work was directed towards determining the best time for spraying against cherry fly (*Rhagoletis cerasi*), which is becoming a serious threat in several cherry growing areas. The first application of DDT should be made between the hatching of all flies on sunny soil patches and ovipositing, followed by another application 8-12 days later. On the first occasion the grass under the tree should be treated as well. However, even correct timing will not ensure success in very cool weather or when the soil temperature varies a great deal. At Wädenswil two applications had very satisfactory results. The biology of the cherry weevil (*Anthonomus rectirostris*) was investigated. In a study of the effect of the new synthetic insecticides on predators of orchard pests, it was found that the ovicidal action of parathion on 24-hour-old eggs of *Epistrophe balteata* is 2,000 times that of nicotine. A dry spray residue of DNC does not harm bees, but the liquid may be carried into the hive in place of drinking water. About 3% of the sodium salt of DNC was shown to be lethal. *Fruit growing*: [For an abstract on the juvenile form in apple and pear trees see *H.A.*, 18: 1626.] Apple rootstock breeding aims at the production of vigorous and resistant types for standard trees, twelve of the types selected for further trial having already been budded. Six new cherry rootstocks are being propagated and six Brompton seedlings have been selected which lend themselves to propagation by layers and cuttings. A selection of vigorous quince seedlings has been carried out on similar lines. The testing of pome and stone fruit varieties as sources of seed continues, the research station acting as a distributor of seed to nurseries. In repeated experiments on walnut grafting in the glasshouse it was found that scions cut in January or March yield a higher percentage of "take" and show more vigorous growth than those cut in February. In further trials the rootstocks most suitable for the walnut varieties commonly grown in Switzerland were determined. After grafting, the application, twice weekly, of a complete liquid manure stimulated growth and increased the length of shoots by 10-12 cm. Of 176 grafts of the variety Franquette 98% were successful, while the average "take" (524 grafts of all varieties) was 90%. As a result of the high temperature in January 1948, buds of many fruit trees began to swell prematurely and then dried up. The injection of a complete liquid manure with a high nitrogen content following irrigation induced the dormant buds to grow out. *Vine growing*: Many rootstock trials were carried out at the research station and in privately owned vineyards showing different conditions. Data on yield and wood production per vine during the first three years after planting are tabulated. The experimental covering of vines as a protection against winter frost has, so far, given promising results. The nursery of American vines at the research station was used to produce clonal cuttings for the purpose of building up stocks for distribution. *Storage*: The newly installed cold storage plant is described and illustrated. In experiments aimed at extending the storage period of dessert pears until mid-winter it was found that the fruit must be stored immediately after harvesting, that it should be kept at 0-1° C. and ripened at 15-20° C. for 6-12 days.

Good results were obtained by storing onion sets at 0° C. and at a relative humidity of 74-79% combined with brisk ventilation. Losses were small and sets kept under these conditions produced onion bulbs of greater weight than sets stored at 8-16° C. The latter, however, is a suitable temperature for the storage of onion bulbs for seed.

2173. WAITE.

Report of the Waite Agricultural Research Institute, Adelaide, S. Australia 1943-1947 [1950], pp. 109.

Subjects of horticultural interest mentioned in this report include the following: *Safflower*. It has been shown that safflower is capable of growing and yielding well as a winter-sown crop in southern Australia. It develops an extensive root system, penetrating to depths up to 7 ft. In a glasshouse experiment the plants at maturity were about 120 cm. high and had about 9 branches in addition to the main stem, most of which carried inflorescences. Approximately one-third of the total number of leaves was carried on the main stem. Water relationships and flowering characteristics were studied. *Guayule*. Investigations on guayule were started in 1942. The factors governing seed germination, nursery production of seedlings, and seedling establishment in the field were determined. Topping was found to be the most important single factor affecting seedling establishment. Cutting back completely to the stem collar gave almost 100% establishment, while the retention of even small amounts of mature leaf reduced establishment considerably. *Plant viruses*. Studies were made of 1. Tobacco mosaic: nitrogen and phosphorus metabolism of affected plants, whole leaf protein of healthy and infected leaves compared, serological work and longevity trials. 2. Tomato spotted wilt: strains, metabolism of tomato plants infected with T.S.W. virus and effect of heat on the T.S.W. virus in the plant. *Plant pathology*. Investigations under way include pre-emergence rotting of peas, dieback of apricots, bacterial blight of cherries, rind blemish of stored oranges. *Biological control of insects*. A survey was made of the parasites already established in South Australia on the citrus black scale (*Saissetia oleae*) and the soft brown scale (*Coccus hesperidum*) and a list of 11 species is given.

2174. WEST AFRICAN CACAO RESEARCH INSTITUTE (W.A.C.R.I.).

Annual Report West African Cacao Research Institute, Tafo, for 1947-48, 1949, pp. 85, 5s. [received 1950].

Virus research (pp. 11-41): Studies described in the preceding report [*H.A.*, 19: 722] have been continued and expanded. A new virus, unrelated to the other known cacao viruses, is thought to be responsible for the death of a patch of trees near Asalu. *Capsid research* (pp. 42-57): Studies on populations of the two species concerned continued, though these were lower than in previous years. Good results were again obtained by painting with DDT emulsion, 4 commercial concentrates proving equally effective. Thrips damage was found to be a contributory factor in unshaded, deteriorated cacao. *Chemistry*: A butter-fat survey of progeny trials and Trinidad introductions

was started. Of particular interest were two *Herranias* yielding over 63% cacao butter, which places them among the highest oil-bearing seeds in West Africa. *Botanical and Horticultural studies*: In the rooting of cuttings 0.5% β -indolylbutyric acid has continued to give better results than other root-stimulating chemicals. In hardening the cuttings, glass-covered bins have given substantially better results than cloth-covered. In progeny trials the progeny of the selection E1 has maintained its superiority with regard both to yield and bean size. In a more recently planted trial, selections B2 and Tf2 also show promise. *Mycology*: Variation in susceptibility has been found among different varieties to *Calonectria rigidiuscula* which is associated with capsid damage. *Physiology*: With Amelonado seedlings kept for 30 weeks under 5 degrees of artificial shading severe pathological symptoms developed in the fully illuminated plants. *Agronomy*: Uniformity, establishment and spacing trials have been started. For planting, basket seedlings have proved much easier to establish than nursery transplants.

New periodicals.

2175. BIOLOGISCHE ZENTRALANSTALT BRAUN-SCHWEIG AND B.Z. BERLIN-DAHLEM.
Pflanzenschutzbestimmungen, 1950, Vol. 2, No. 1, 102 pp.

In this journal, which is published as a supplement to *NachrBl. dtsh. PflSchDienst*, German regulations on plant protection are collected periodically; in addition the regulations of some neighbouring countries are also printed *in extenso*.

2176. THE COCONUT RESEARCH SCHEME (CEYLON).
The Ceylon Coconut Quarterly, 1950, Vol. 1, No. 1, pp. 36.

We welcome the appearance of a new journal described as a "popular journal devoted to coconuts" issued under authoritative management.

2177. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.

Abstracts on agricultural and horticultural engineering, 1950, Vol. 1, No. 1, 160 abstracts, stencilled, 4s.

We would draw our readers' attention to this new issue. Out of the 22 abstracts under "Horticulture" 5 are of articles which would not have been noted in *Horticultural Abstracts*, since they occur in technical publications not generally seen by the Commonwealth Bureau of Horticulture.

Noted.

- 2178.

a KNAPP, R.

Einführung in die Pflanzensoziologie. (An introduction to plant sociology.)

H. I. *Arbeitsmethoden der Pflanzensoziologie und die Eigenschaften der Pflanzengesellschaften*. (Methods of plant sociological work and the characteristics of plant associations.)

H. II. *Die Pflanzengesellschaften Mitteleuropas*. (The plant associations of central Europe.)

H. III. *Angewandte Pflanzensoziologie*. (Applied plant sociology.)

Eugen Ulmer, Stuttgart, [1949 ?], pp. 100, 94 and 132, illus.

b WALTER, H.

Grundlagen der Pflanzenverbreitung. I. Teil: Standortlehre (analytisch-ökologische Geobotanik). (The elements of plant distribution. I. The habitat (analytical-ecological geobotany).)

Eugen Ulmer, Stuttgart, 1949, pp. 108, bibl. pp. 2½, illus.

c WEST OF SCOTLAND AGRICULTURAL COLLEGE.

Annual Report of the West of Scotland Agricultural College, Glasgow, 1948-1949, 1950, pp. 61.